WORK BOOK
To
A New Certificate
PHYSICS

H. C. MAURYA

PITAMBAR PUBLISHING COMPANY

WORKBOOK TO
A NEW
CERTIFICATE PHYSICS

Based on the latest syllabus in Physics by the Council for the Indian School Certificate Examination, New Delhi for the I.C.S.E. Examination (Classes IX-X)

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TO
A NEW
CERTIFICATE PHYSICS

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PREFACE

Workbook to "A New Certificate Physics" has been prepared according to the latest syllabus for the Indian Certificate of Secondary Education (ICSE) as prescribed by the Council for The Indian School Certificate Examination, New Delhi.

It contains various types of questions *viz.*, Objective Type, Short-Answer Type, Numericals etc. Answers have also been provided to numerical problems.

Students are advised to go through each question of the Workbook. A sincere attempt will lead to a better understanding of the fundamental principles of Physics.

The undersigned is grateful to M/s Pitambar Publishing Company for Publishing the boook.

Students and teachers are welcome to send valuable suggestions for the improvement of the book for which the author shall be grateful.

—**H. C. MAURYA**

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1

Measurement of Physical Quantities

1. (*a*) (*i*) Define a physical quantity.

....

....

(*ii*) A physical quantity is measured in a unit. Define Unit.

....

....

(*iii*) Name the fundamental units :

A. .... B. .... C. ....

(*iv*) The fundamental units stated in (*iii*) are measured in different systems. Name the systems :

(1) ....

(2) ....

(3) ....

(4) ....

(*v*) The S.I. system has adopted four more fundamental units. These are

A. ....

B. ....

C. ....

D. ....

(*vi*) What are the abbreviations for A, B, C and D mentioned in (*v*) ?

A. .... B. .... C. .... D. ....

(*vii*) Every measurement involves two things. Name these :

...................................., ...

(*viii*) (*a*) Why it is necessary to standardise units ?

....

....

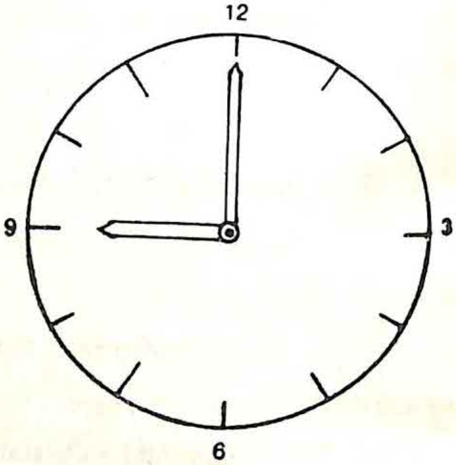
(*b*) What are derived units ? Give two derived units, and name the physical quantities they represent.

....

....

....

2. (*a*) The adjoining figure shows a wrist watch with minute hand at 12 and hour hand at 9.



(*i*) What is the least count of the watch ?

....

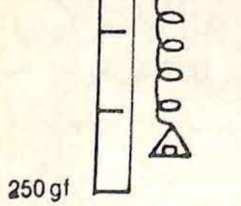
(*ii*) What is the time ?

....

(*iii*) If the minute hand comes to '6' how much the hour hand moves ?

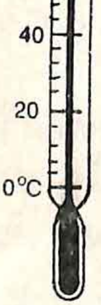
....

(*b*)



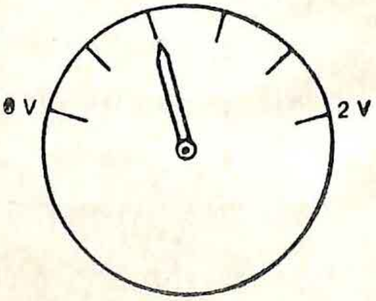
SPRING BALANCE

FIG 1



THERMOMETER

FIG 2

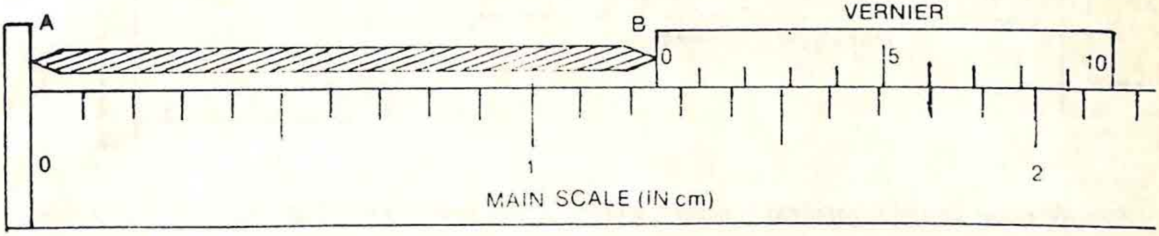


VOLTMETER

FIG. 3

	Fig. 1	Fig. 2	Fig. 3
Least count			
Final reading			

3.



The diagram above represents a slide calliper. It is used to measure the length of a rod AB. Given that 10 divisions of vernier coincide with 9 mm of the main scale :

(*i*) What is the least count of the vernier ?

....

(*ii*) What is the main scale reading ?

....

(*iii*) Which division of vernier coincides with the main scale ?

....

(*iv*) What is the length of the rod AB ?

....

(*v*) If the length of the same rod is measured by a metre rule then what difference in measurement can occur. Why ?

....

....

....

(*vi*) What is meant by vernier constant ?

....

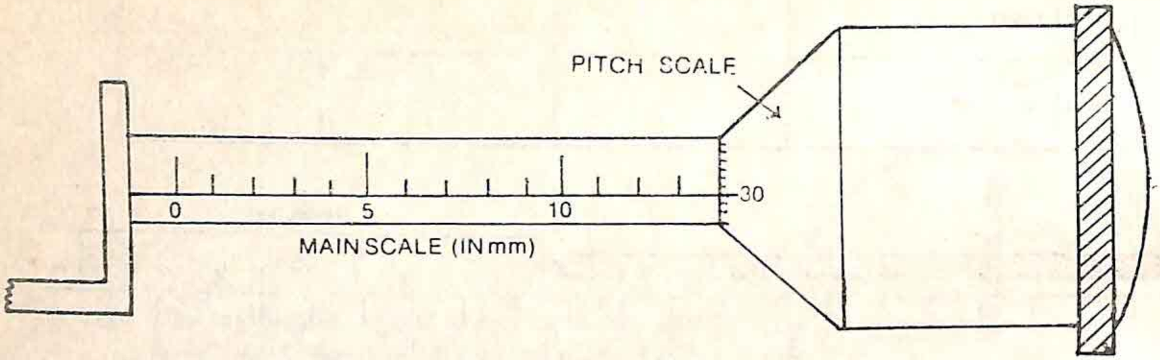
....

(*vii*) What is meant by the zero error of the vernier calliper ?

....

....

4.



The diagram above represents a screw gauze. Any measurement gives the final position of the scales in the above diagram. The circular scale has 50 divisions.

(*i*) What is the pitch of the screw gauze ?

....

(*ii*) What is the least count of the screw gauze ?

....

(*iii*) If 30th division of circular scale coincides with main scale line then what is the final reading ?

....

(*iv*) What is the back-lash error of a screw gauze ?

....

....

5. (*a*) For a simple pendulum define the following terms :

(*i*) Time period : ....,

....,

(*ii*) Frequency of oscillation : ....

....,

(*iii*) Amplitude : ....,

....,

(*iv*) Workout relation between time period and frequency : ....

...., (*v*) How will the time period be affected if :

Length of string is doubled ? ....

....

Mass of the bob is doubled ? ....

....

(*b*) What is the principle of measurement of time ?

....

....

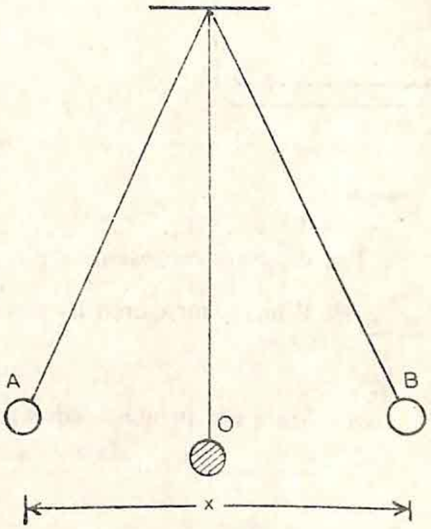
(*c*) Give one example of measurement of time.

....

(*d*) What is the time period of a seconds pendulum ?

....

(*e*) If the bob of the pendulum takes 0·2 seconds to move from position A to position B, then calculate :



(*i*) The time period of the pendulum.

....

(*ii*) The amplitude of the oscillation.

....

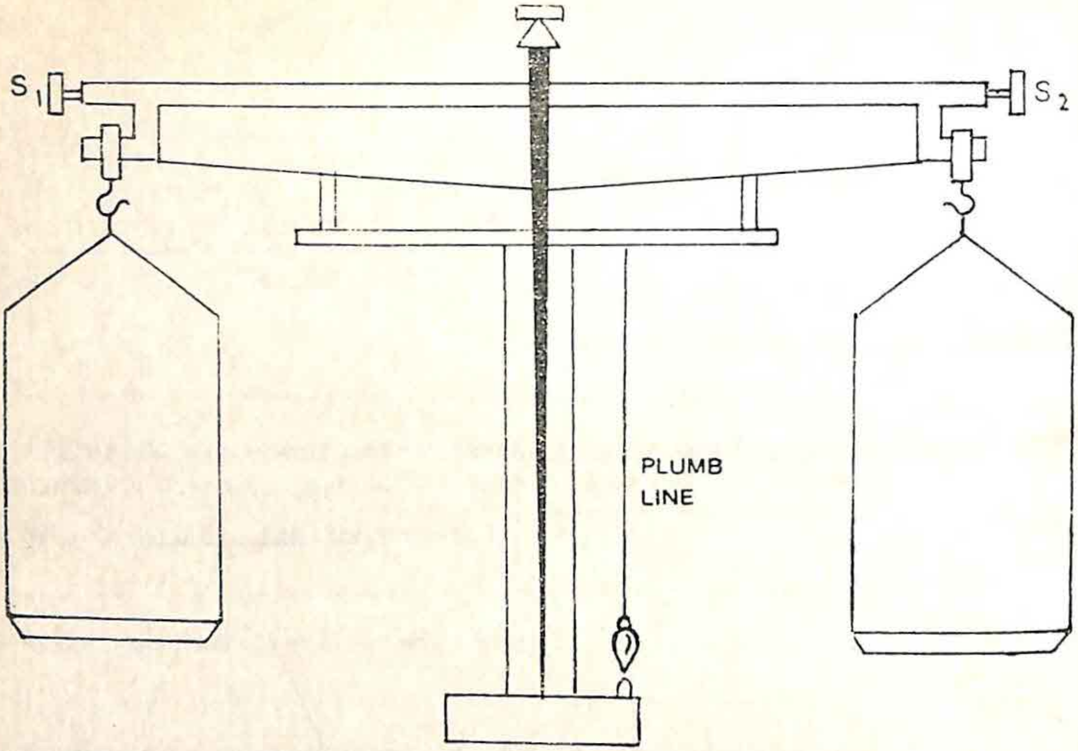
(*iii*) Frequency of the oscillation.

....

(*f*) A pendulum of length 1 m has a time period of 2 s. Calculate the time period if its length is changed to 0·5 m.

....

6. (*a*)



The diagram represents a physical balance.

(*i*) What is measured by physical balance ?

(*ii*) State the principle on which it works.

(*iii*) What is the role of :

Plumb line

Screws S_1, S_2

(*iv*) State three requirements for a good balance :

1.

2. ....

3. ....

(*v*) If a balance given to you is faulty then, how do you proceed to know the correct mass ?

....

....

....

(*b*) Define weight of a body.

....

(*c*) Mention one difference in use of spring balance and physical balance.

....

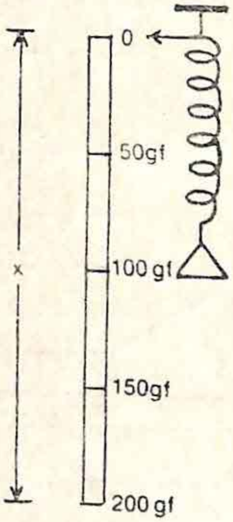
....

(*d*) Where on the earth's surface is the weight of a body :

(*i*) Maximum : ....

(*ii*) Minimum : ....

(*e*) The diagram represents a spring balance. The pointer can move to maximum of distance x. The maximum value of weight is 200 gf. If pointer moves 3/4th of x then what weight is recorded ?



ANSWERS

2. (*a*) (*i*) 5 min, (*ii*) 9 o'clock, (*iii*) 15°. (*b*) Least count 50 gf ; 4°C ; 0·4 V. Final reading 50 gf ; 72°C ; 0·8 V. **3**. (*i*) 0·01 cm, (*ii*) 1·2 cm, (*iii*) 6th division, (*iv*) 1·26 cm. **4** (*i*) 1 mm., (*ii*) 0·02 mm., (*iii*) 13·6 mm. **5**. (*e*) (*i*) 0·4 second, (*ii*) $x/2$, (*iii*) 3. (*f*) 1·41 seconds. **6**. (*e*) 150 gf.

□ □

2

Moments, Centre of Gravity, Density

1. (*a*) Define a rigid body.

(*b*) Define the term Force.

(*c*) Give S.I. unit of Force.

(*d*) Is it a scalar or vector quantity ?

2. (*a*)

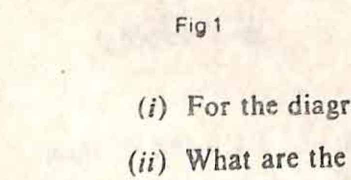


Fig 1

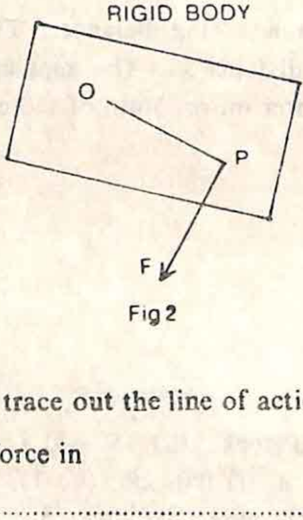


Fig 2

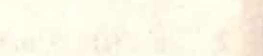


Fig 3

(*i*) For the diagrams above trace out the line of action.

(*ii*) What are the effects of force in

Fig. 1.

Fig. 2.

Fig. 3.

(*b*) For which figure can we use the term "Moment of a Force about a Point" ?

....

(*c*) What is meant by this term ?

....

....

(*d*) Give the S.I. unit of moment of a force.

....

(*e*) Is it a scalar or vector quantity ?

....

(*f*) What is the alternate term used for moment of a force ?

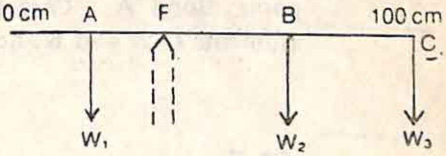
....

(*g*) What convention do we adopt for the term stated in (*f*) ?

....

....

3. Under action of three forces W_1, W_2 and W_3 the metre rule is balanced.



(*i*) What is the condition for the metre rule to be in equilibrium ?

....

....

(*ii*) Write the moment of force about F :

for W_1 ....

for W_2 ....

for W_3 ....

(*iii*) Give the direction for moment of force for :

W_1 ....

W_2 ....

W_3 ....

(*iv*) Write the equilibrium equation.

....

4. A uniform metre rule is balanced at 30 cm mark by a weight of 10 N which hangs at 0 cm mark. Calculate :

(*i*) Clockwise moment : ....

....

(*ii*) Anticlockwise moment : ....

....

(*iii*) Weight of the metre rule . ...

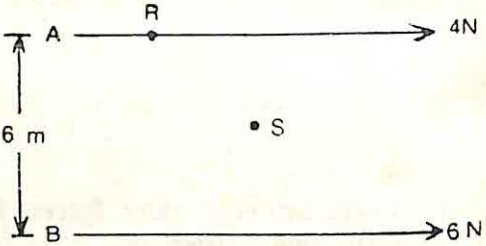
....

5. A uniform metre rule breaks at 86 cm mark. At which mark will the longer piece balance.

....

....

6. (*a*) A and B are two forces 6 m apart. S is a point midway between A and B. R is a point along A. Calculate the sum of moments of A and B about



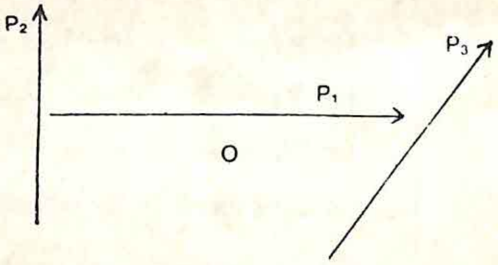
(*i*) S ....

....

(*ii*) R ....

....

(*b*) P_1, P_2 and P_3 are three forces as shown. The point O is in the same plane. If $P_1=6$ N, $P_2=6$ N, $P_3=8$ N



(*i*) Which of the forces has the least moment about O ?

....

(*ii*) Which force has positive moment ?

....

(*iii*) Which forces have negative moment ?

....

....

(*c*) Explain why it is easier to push a door from the free end than near the hinges ?

....

....

7. (*a*) (*i*) What is meant by Couple ?

....

....

(*ii*) What is the effect of a couple ?

....

(*iii*) Give three examples of a couple :

(1) ....

(2) ....

(3) ....

(*iv*) What is the moment of a couple ?

....

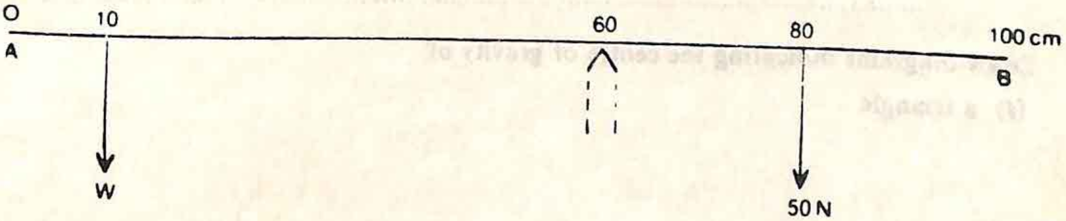
(*v*) How is it measured ?

....

....

....

(*b*) For the given diagram, calculate :



(*i*) Anticlockwise moment.

....

....

(*ii*) The magnitude of W.

....

....

(*iii*) If 50 N weight is immersed completely in water, the 'W' weight is shifted to 20 cm mark in order to balance the metre rule. What is the loss in weight ?

....

(*iv*) What is the upthrust offered by water ?

....

(*c*) Two persons carry four cement bags on a rigid pole 4 metres long. The bags are kept at the centre of the pole and the ends of the pole rest on their shoulder. Each bag weighs 40 kg.

(*i*) Calculate the reaction on their shoulder neglecting the weight of the pole.

....

....

....

....

(*ii*) Now one comes close by 0·8 metre, what are the reactions ?

....

....

(*iii*) In which of the two cases is the reaction less ?

....

(*iv*) What do you advise for easy carrying and why ?

....

....

8. Draw diagrams indicating the centre of gravity of

(*i*) a triangle

(ii) a rectangle

(iii) a circle

(iv) a cylinder

(v) a cone

9. *(a)* Explain giving suitable explanation of the following :

(i) On a see-saw, a thin boy can balance a fat one.

....

....

(*ii*) A glass tumbler has bigger base.

....

....

(*iii*) A person leans inward when he moves up a slope.

....

....

(*iv*) A tight rope walker carries a long pole in hand while walking.

....

....

(*b*) (*i*) What is the condition for a stable equilibrium ?

....

....

(*ii*) Give one example.

....

....

(*c*) (*i*) When can we say that a body is in state of neutral equilibrium ?

....

....

(*ii*) Give one example.

....

....

(*d*) (*i*) When can we say that a body is in state of unstable equilibrium ?

....

....

(*ii*) Give one example.

....

....

10. (*a*) Define the term Density.

....

....

(*b*) Write its S.I. unit.

....

(*c*) Is it a scalar or vector quantity ?

....

(*d*) Define the term relative density.

....

....

(*e*) Give the alternate term used for relative density.

....

(*f*) What is the difference between density and relative density ?

....

....

11. A cube of lead of side 3 cm. weighs 101·7 g. Find the density of lead.

....

....

....

12. A rectangular block of oak wood 10 cm long, 5 cm broad and 2·5 cm high weighs 100 g. Find its

(1) volume : ....

....

(2) density : ....

....

....

13. The diameter of a cylinder of brass is 5 cm, while its height is 9 cm, and it weighs 1·5 kg. Find its

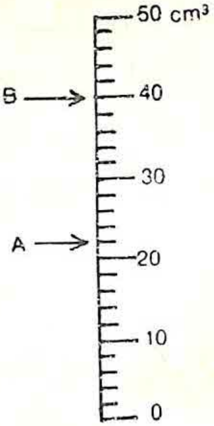
(1) volume : ....

....

(2) density : ....

....

....



14. When a piece of solid of mass 60 g is immersed completely in water the level of water rises from A to B. Calculate the

(1) volume of solid

....

(2) density of solid in kg/m³.

....

....

15. In an experiment using a RD bottle the following readings were obtained :

mass of empty bottle=35·450 g.
mass of bottle+liquid=55·550 g.
mass of bottle+water=65·450 g.
Calculate the density of the liquid.

....

....

....

....

16. (*a*) Name the substance which can

(1) float on water : ....

(2) sink in water : ....

(*b*) Give reason for above.

....

....

....

(*c*) "Relative density of mercury is 13·6." What information do you get from this statement ?

....

....

17. (*a*) Name

    (1) a densest liquid

    (2) a lightest gas

    (3) a densest metal

    (*b*) Name

    (1) a substance whose volume decreases on melting.

    ....

    (2) a substance whose volume increases on melting.

    ....

18. Air in a room of dimension 5 m × 3 m × 2·5 m has density 8·2 kg/m^3.
Calculate :

    (1) Volume of air.

    ....

    (2) Mass of air.

    ....

19. Discuss the variation of density of water when it is heated from 0°C to 10°C.

....

....

....

....

....

....

20. Calculate the relative density of cork from the following observations :

Weight of cork in air = 0·30 g.

Weight of cork in air + sinker in water = 9·40 g.

Weight of cork and sinker in water = 7·32 g.

....

....

....

....

ANSWERS

4. (*i*) 0·2 W N-M, (*ii*) 3 N-M, (*iii*) 15 N. **5.** 43 cm. **6.** (*a*) (*i*) 30 N-M, (*ii*) 36 N-M. **7.** (*b*) (*i*) 0·5 W N-M, (*ii*) 20 N, (*iii*) 5 N, (*iv*) 5 N. (*c*) (*i*) 800 N each, (*ii*) 600 N, 1000 N. **11.** 3·76 g/cm^3. **12.** (*i*) 125 cm^3, (*ii*) 0·80 g/cm^3. **13.** (*i*) 176·63 cm^3, (*ii*) 8·49 g/cm^3. **14.** (*i*) 18·0 cm^3, (*ii*) 3333·33 kg/m^3. **15.** 0·67 g/cm^3. **18.** (*i*) 37·5 m^3, (*ii*) 307·5 kg. **20.** 0·14.

□ □

3

Force and Motion

1. (*a*) Define the term Force. ....

....

(*b*) Write its SI Unit.

....

(*c*) Is it a vector or scaler quantity ?

....

(*d*) Give three examples of force :

(*i*) in contact : ....

....

(*ii*) not in contact : ....

....

(*e*) Name a device which measures Force.

....

(*f*) On which law is the above device based ?

....

2. (*a*) Name a type of contact force which causes

(*i*) acceleration in a body.

....

(*ii*) retardation in a body.

....

(*b*) Mention two effects of a force.

....

....

3. (*a*) Define :

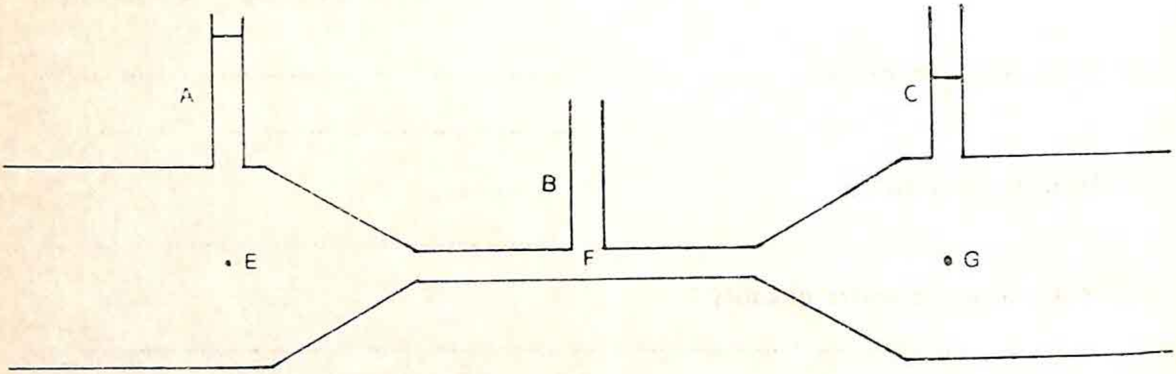
(*i*) Stream line flow : ....

....

(*ii*) Turbulent flow : ....

....

(*b*) The diagram shows flow of a liquid through varying cross-section.



(*i*) Label the heights of liquid in vertical tubes A, B and C.

(*ii*) What is a comparative pressure at

A .... B .... C ....

(*iii*) What is comparative velocity of liquid at

E .... F .... G ....

(*iv*) Choose the correct one

Pressure at any cross section

(*a*) is directly proportional to velocity.

(*b*) is inversely proportional to velocity.

(*c*) directly proportional to the area of cross section.

(*v*) Choose the correct one

Velocity of a liquid is

(*a*) directly proportional to the area of cross-section.

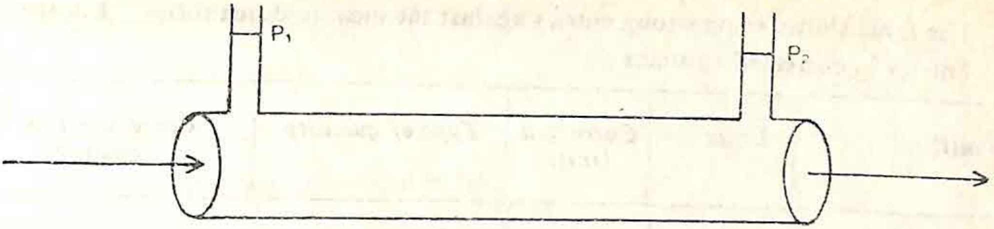
(*b*) inversely proportional to the area of cross-section.

(*c*) inversely proportional to the pressure.

4. (*a*) State Bernoulli's principle for a flow of liquid ....

....

(*b*)



The above diagram shows a horizontal tube of uniform cross-section area. When liquid flows it is seen that pressure P_1 is greater than P_2. The above observation is a consequence of

(*i*) energy conservation

(*ii*) energy is not conserved

Choose the correct one.

(*iii*) Give suitable explanation for your choice.

(*c*) Give one application of Bernoulli's principle.

5. (*a*) What is meant by friction ?

(*b*) Give one advantage of friction.

(*c*) Give one disadvantage of friction.

(*d*) Mention three ways to reduce friction.

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(*e*) What is direction of force of friction with respect to the direction of external force?

....

6. (*a*) The table shows some wrong entries against the measured quantities. Fill the wrong entries in corrected columns :

Quantity	*Units*	*Corrected Units*	*Type of quantity*	*Corrected type of quantity*
Distance	*m*		Scalar	
Displacement	*m*		Scalar	
Time	*s*		Scalar	
Speed	*m.s*		Vector	
Velocity	*m/s*		Vector	
Acceleration	m/s^2		Scalar	

(*b*) (*i*) A body starts from rest and is accelerated to 2 m/s^2 in 4 s. Calculate its velocity at the end of 4 s. ....

....

....

(*ii*) A body of mass 0·2 kg strikes a wall with velocity 10 m/s. It then rebounds, if collision is elastic :

(*a*) what is its velocity after striking the wall ? ....

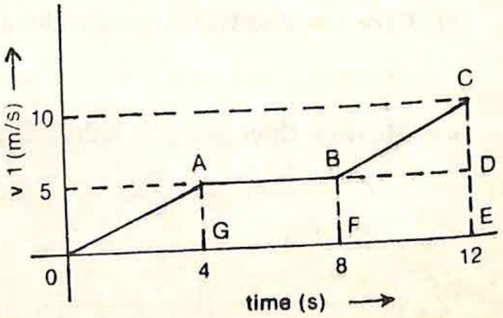
(*b*) change in momentum.

....

(*c*) The figure shows velocity-time grapn of a body.

(*i*) Calculate slope of the portion AGO......

....



(*ii*) What have you calculated in (*i*) ?

....

(*iii*) Calculate area of the portion AGO.

....

....

(*iv*) What have you calculated in (*iii*) ?

....

(*v*) Calculate area of the portion ABFG.

....

....

(*vi*) What have you calculated in (*v*) ?

....

(*vii*) Calculate the area of the portion BCD and BDEF.

....

....

(*viii*) Work out total area *i.e.*, AGO+ABFG+BCD+BDEF.

....

....

....

....

(*ix*) What this total area mean ?

....

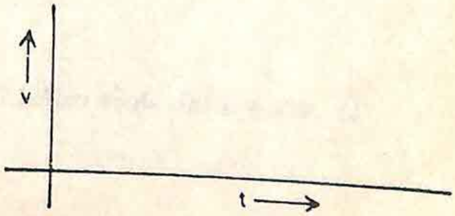
(*x*) For which portion of the graph the body moves with

constant velocity..

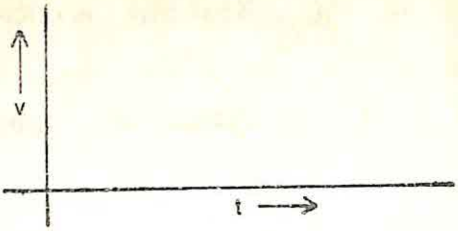
uniform acceleration..

7. For the following cases give the shape of velocity-time graph :

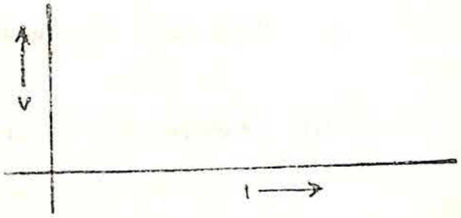
(*a*) A body is thrown vertically up till it reaches the ground.



(*b*) A body is thrown in air at an angle till it touches the ground.



(*c*) A body is rolled on ground till it comes to rest.



8. A person takes 4 min. to go straight to a certain point which is 10 m from his starting point. He stays there for 2 min. and again comes back to his reference point in 6 min :

(*a*) Draw displacement-time graph.

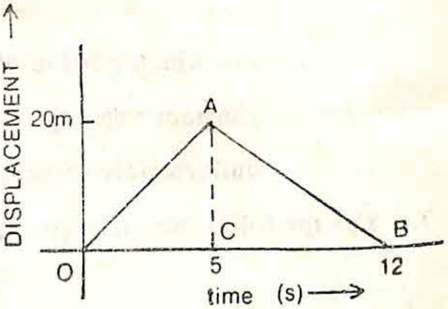
(*b*) What is the total displacement ?

....

9 The graph depicts displacement-time relation for a body.

(*a*) Calculate slope of the portion ACO..................

....



(*b*) What is this slope called ?

....

(*c*) Calculate displacement at the end of 3s.

....

(*d*) Calculate slope of the portion ABC.

....

....

(*e*) What is the difference between the slope of ACO and ABC ?

....

....

(*f*) (*i*) State the type of velocity calculated.

....

(*ii*) Define the stated velocity.

....

....

(*iii*) Give one example of the above type of velocity.

....

10. (*a*) State Newton's laws of motion.

I ....

....

II ....

....

III ....

....

(*b*) Explain each of the following :

(*i*) When you step ashore from a rowing boat it tends to leave the shore.

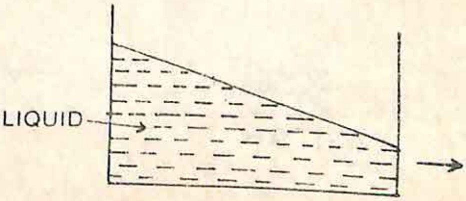
....

....

(*ii*) When a car stops suddenly you are thrown in forward direction. ....

....

(*iii*) The container is moved suddenly from left to right the liquid and takes its shape as shown. Why ?



....

....

(*c*) (*i*) What is meant for acceleration due to gravity ?

(*ii*) What is value of 'g' at the centre of the earth ?

(*iii*) Where on the earth surface the value of 'g' is maximum ?

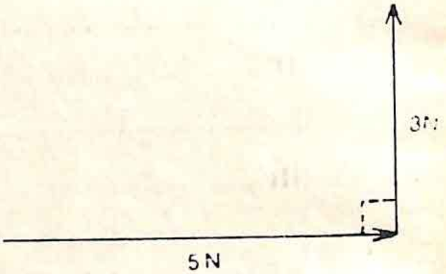
(*d*) A ball is dropped from the top of a building, calculate

(*i*) its velocity when it has fallen 5 m.

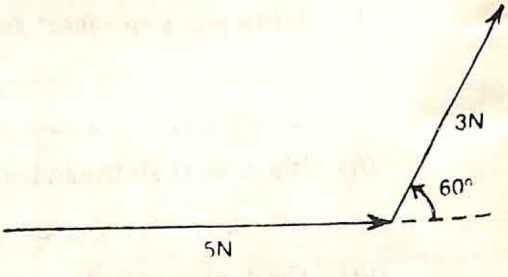
(*ii*) the distance covered in 4 s.

11. (*a*) **Find the magnitude of the resultants of the two vectors for the following figures :**

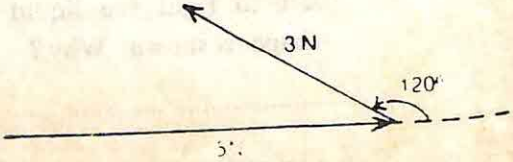
(*i*) **R=**



(*ii*) **R=**



(*iii*) **R=**



(*b*) An aeroplane moves with velocity 60 km/hr towards north. Wind flows from west to east with velocity 20 km/hr.

(*i*) Give the vector representation.

(*ii*) From the diagram calculate
Resultant velocity of the plane.

....

Direction of the plane.

....

....

12. (*a*) Define the terms

Work : ....

....

Kinetic Energy : ....

....

Potential Energy : ....

....

(*b*) Give the SI units of

Work : .... K.E. : .... P.E. : ....

(*c*)

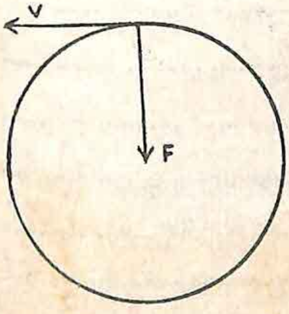


Fig 1

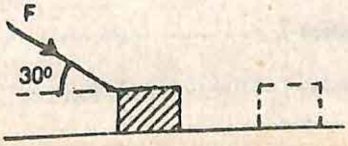


Fig 2

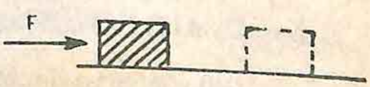


Fig 3

For which figure work done is

(*i*) Maximum :

(*ii*) Zero :

(*iii*) In between zero and maximum :

(*d*)

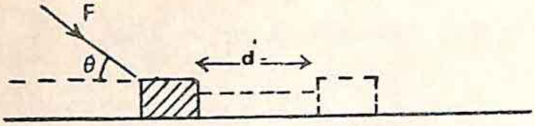


Fig 1

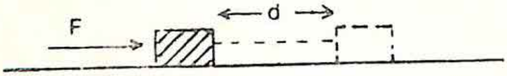


Fig 2

For the same displacement which figure gives

(*i*) least work expression W=

(*ii*) maximum work expression W=

(*iii*) Give explanation for the difference in work for above.

(*e*) (*i*) Calculate the work done when 10 kg of water is pumped to a height of 10 m. Take $g=9{\cdot}8\ \text{m/s}^2$.

(*ii*) Calculate the energy possessed by a particle of mass 100 g moving with velocity 5 m/s.

13. (*a*) How will the K.E. of a body change if

(*i*) its velocity is doubled ?

(*ii*) its momentum doubles ?

(*iii*) its mass doubles ?

(*b*) **What are the energy changes in each of the following :**

(*i*) A watch spring is wound and the watch runs till it is forced to stop. ....

....

(*ii*) Water falling from a certain height till it touches the ground. ....

....

(*c*) Give one example for the following change in energy :

(*i*)	Electric Energy	Mechanical Energy
	....	....
(*ii*)	Chemical Energy	Electric Energy
	....	....
(*iii*)	Mechanical Energy	Potential Energy
	....	....
(*iv*)	Kinetic Energy	Potential Energy
	....	....

14. (*a*) Define the term power ....

....

Give its S.I. units ....

(*b*) A motor lifts a mass of 50 kg vertically upwards through a distance of 10 m in 1 minute. Calculate the power at which motor works.

....

....

(*c*) A monkey on a swing reaches a maximum height of 1·5 m above its lowest position. What is the speed of the swing at the lowest point ? ....

....

(*d*) A man holds 10 kg weight for 10 s. What is the work done ? Give reason for your answer.

....

....

....

(*e*) A coolie of 600 N lifts a luggage of 400 N through a vertical height of 1·5 m. Calculate the work done

....

....

ANSWERS

6. (*b*) (*i*) –10 m/s. (*ii*) 4 kg m/s. (*c*) (*i*) 1·25 m/s^2, (*iii*) 10 m, (*v*) 20 m, (*vii*) 10 m, 20 m, (*viii*) 60 m. **8.** (*b*) zero. **9.** (*a*) 50 m/s, (*c*) 12 m, (*d*) 70 m/s. **10.** (*d*) (*i*) 9·9 m/s, (*ii*) 39·2 m. **11.** (*a*) (*i*) $\sqrt{34}$ N, (*ii*) 7N, (*iii*) 7N (*b*) (*ii*) 63·24 km/hr, $\theta = 18^\circ\ 26'$ N-E. **12.** (*e*) (*i*) 980 J, (*ii*) 1·25 J. **14.** (*b*) 81·67 J/s, (*c*) 5·42 m/s. (*d*) zero, (*e*) 600 J.

□ □

4

Simple Machines

1. (*a*) (*i*) What is a lever ?

....

....

(*ii*) What are the three factors which we consider while using **a lever ?**

....

....

....

(*iii*) What is first order lever ?

....

Give one example.

....

What is its M.A. ?

....

(*iv*) What is second order lever ?

....

Give one example.

....

What is its M.A. ?

....

(*v*) What is third order lever ?

....

Give one example.

....

What is its M.A. ?

....

(*b*) (*i*) What is a machine ?

....

....

....

(*ii*) What is the principle of working of a machine ?

....

....

(*iii*) Define the following terms for a machine :

Mechanical advantage : ....

....

Velocity Ratio : ....

....

Efficiency : ....

....

(*iv*) How many kinds of simple machine are there ?

....

....

(*v*) What is the physical significance of saying that M.A. is greater than 1 ?

....

....

(*vi*) Give reason why for an actual machine efficiency less than 100 %.

....

....

2. (*a*) (*i*) What is a Pulley ?

....

....

....

(*ii*) Name two parts of Pulley. A. ....

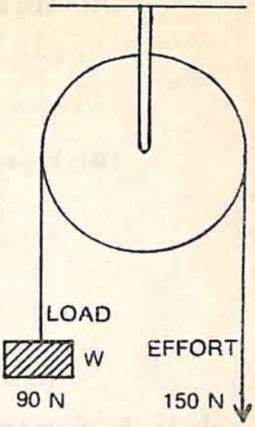
B. ....

(*iii*) Neglecting the weight of pulley and frictional forces, name the pulleys for which

(A) M.A.=1 : ....

(B) M.A.=2 : ....

(*iv*) The diagram shows a fixed pulley. A load of 90 N is lifted by effort of 150 N through a vertical height of 3 m in 5 seconds. Neglect weight of pulley.



(A) What is the velocity ratio of the pulley machine ?

....

....

(B) What is the mechanical advantage ?

....

....

(C) Calculate the efficiency of the machine.

....

....

(D) What is the energy gain by the load in 3 seconds ?

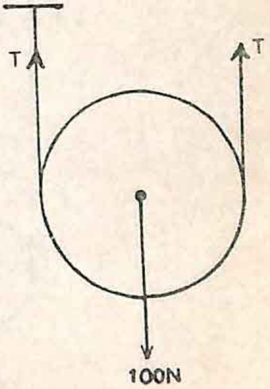
....

....

(E) How much power has developed by raising the load ?

....

....



(*b*) The diagram shows a single movable pulley. Neglecting the weight of pulley, calculate

(A) Mechanical advantage of the pulley machine.

....

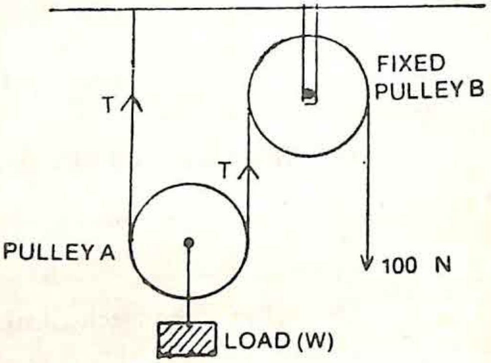
....

(B) What is the effort needed to lift 100 N load ?

....

....

3. (*a*) In the diagram, effort of 100 N is applied to lift the unknown load. Calculate



(*i*) Tension in the string.

....

....

(*ii*) Mechanical advantage if the efficiency is 90%.

....

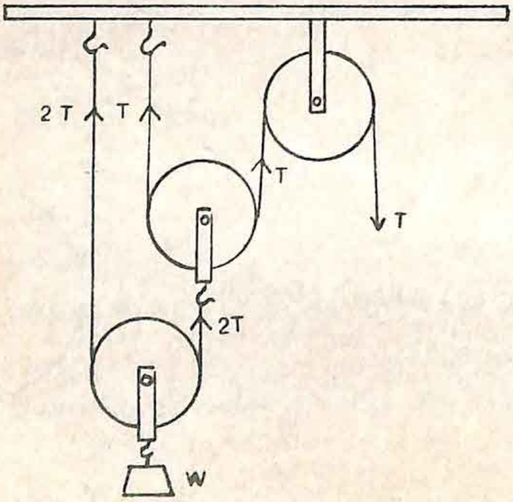
....

(*iii*) Unknown load (W) : ....

....

(*b*) For the given combination of movable pulleys work out velocity ratio and mechanical advantage :

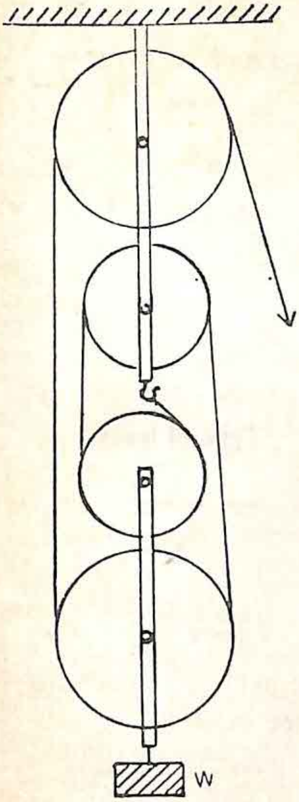
(*i*)



V.R. ....

M.A. ....

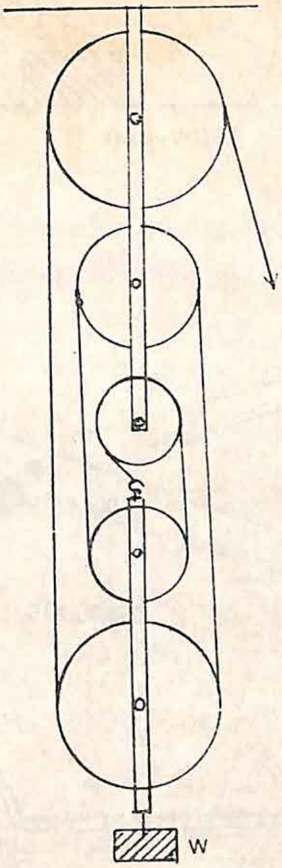
(*ii*)



V.R. ....

M.A. ....

(*iii*)

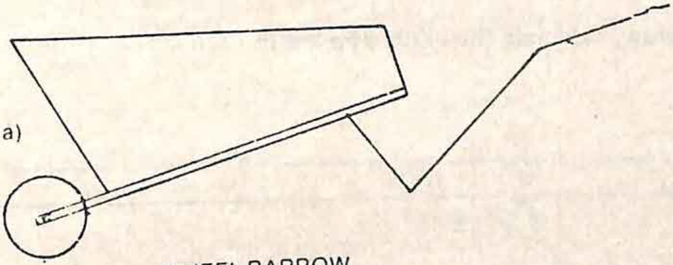


V.R ....

M A. ....

4. In the diagrams mark the position of fulcrum. Also draw the arrows to show the direction of load and effort. What class of lever do the diagrams show ?

(a)

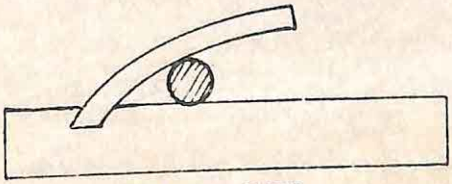


WHEEL BARROW

Type of lever

....

(b)

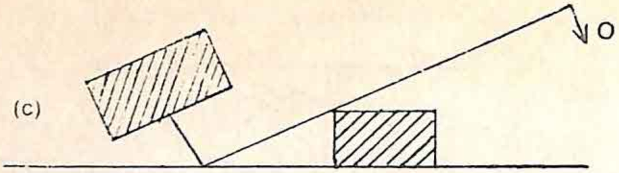


NUT CRACKER

Type of lever

....

(c)

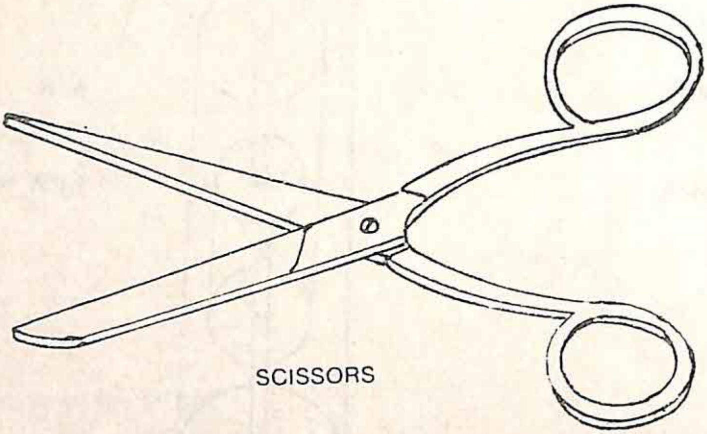


CROW BAR

Type of lever

………………………………………………

(d)

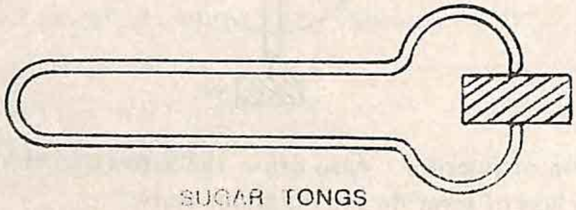


SCISSORS

Type of lever

…………………………………

(e)



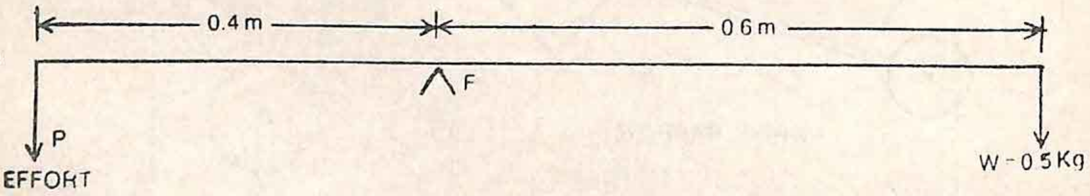
SUGAR TONGS

Type of lever

………………………………………………

5. For the diagrams given below, calculate the effort applied in each case.

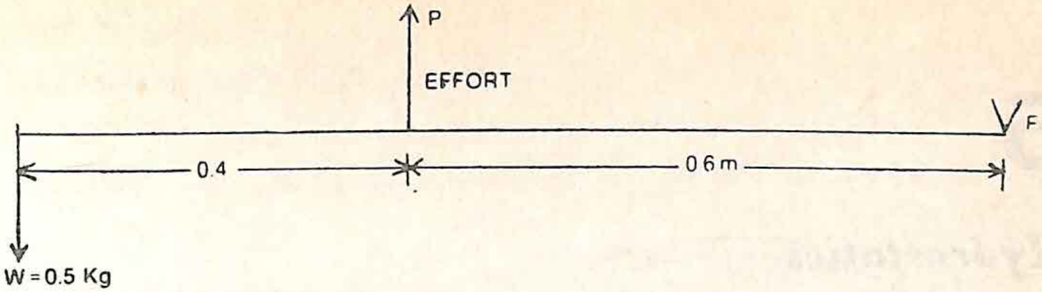
(a)



……

……

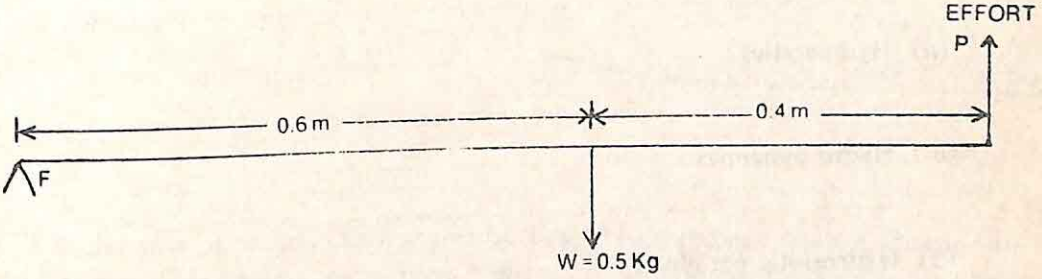
(b)



……………………………………………………………………………………………………

……………………………………………………………………………………………………

(c)



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ANSWERS

2. (*a*) (*iv*) (A) 1, (B) 0·60, (C) 60%, (D) 270 J, (E) 54 W. (*b*) (A) 2, (B) 200 N. **3.** (*a*) (*i*) T = 100 N, (*ii*) 1·8, (*iii*) 200 N. **5.** (*a*) P = 7·4 N, (*b*) P = 8·2 N, (*c*) 2·9 N.

☐ ☐

5

Hydrostatics

1. (*a*) What do you mean by the terms

(*i*) Fluid ....

....

(*ii*) Hydrostatics : ....

....

(*iii*) Hydro dynamics : ....

....

(*iv*) Hydrostatic paradox : ....

....

(*b*) Define pressure : ....

....

Give its

S.I. Unit : ....

C.G.S. unit : ....

(*c*) Can we write unit of pressure as pascal instead of N/M^2 ? (Yes/No)

(*d*) Choose the correct one :

The force exerted by a fluid is always

(*i*) Normal to the surface area presented.

(*ii*) Tangential to the surface area presented.

(*iii*) In any direction to the surface area presented.

....

(*e*) In which case is the pressure exerted by a person on the ground more when standing on his

(*i*) Two feet

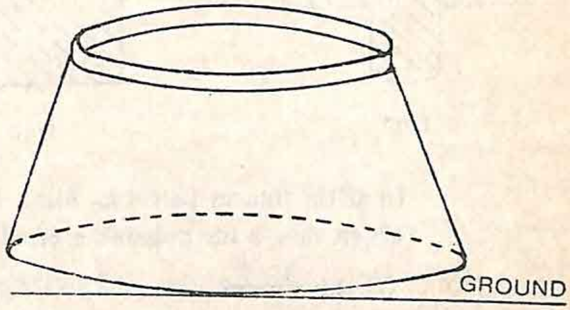
(*ii*) One foot

Give the explanation for the above choice.

....

....

2. (*a*) In the adjoining figure, the area of cross-section of a iron bucket in contact with the ground is 0·03 m^2. The bucket exerts a pressure of 100 N/m^2 on the ground. Calculate the force of the bucket.



....

....

(*b*) A flower vase of mass 5 kg has area of base 8 cm × 10 cm. Another flower vase of same mass has an area base 10 cm × 10 cm. Calculate the pressure exerted by each flower vase.

....

....

....

Why is there difference in the calculated pressure ?

....

Which is more likely to damage ground's surface ?

....

....

3. (*a*) (*i*) On what factors does the pressure at a point below the surface of liquid depend ?

....

....

....

(*ii*) What is fluid pressure ?

....

(*b*) Calculate pressure exerted by water at a depth of 5 m.

(*c*)

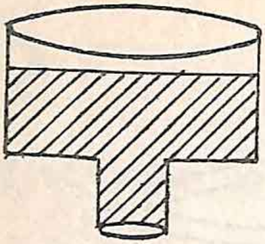


Fig 1

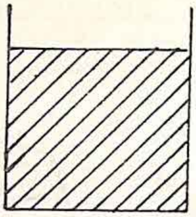


Fig 2

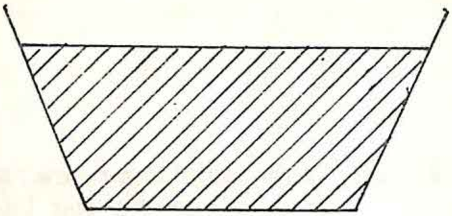


Fig 3

In allthe figures petrol is filled in such a way that its level remains the same. In which case is the pressure exerted by petrol

(*i*) Maximum : ....

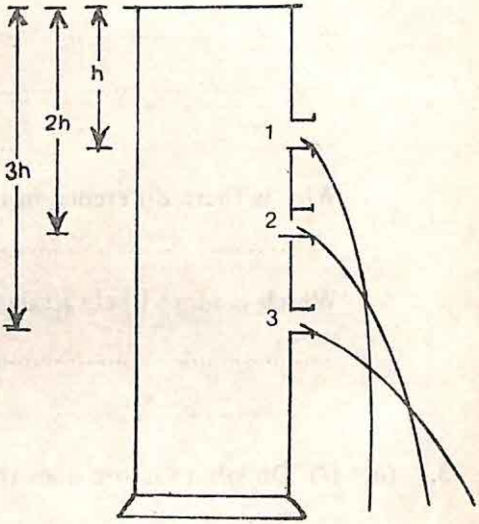
(*ii*) Minimum : ....

Give reasons for (*i*) and (*ii*)

....

....

4. The adjoining figure shows lateral pressure due to a liquid.



(*i*) In terms of depth '*h*' and density '*d*' calculate pressure at

Hole 1 : ....

Hole 2 : ....

Hole 3 : ....

(*ii*) The liquid from hole 3 is thrown to a maximum distance. Why ?

....

....

(*iii*) At which hole is the velocity of flow

(A) Maximum : ....

(B) Minimum : ....

Give reason for A and B.

....

....

5. Explain the following :

(*i*) Two holes are made in an oil tin to remove oil from it.

....

....

(*ii*) A metal ship does not sink in water.

....

....

(*iii*) The volume of air bubble increases as it rises from the bottom of a pond.

....

....

(*iv*) Divers experience chest pain when they come out from deep water.

....

....

(*v*) Big structures have broad base.

....

....

6. (*a*) Define Pascal's Law : ....

....

....

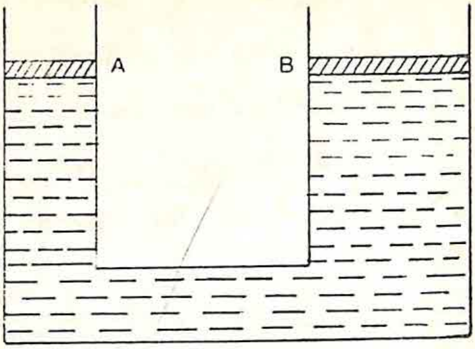
(*b*) Name three devices which make use of Pascal's law.

1. ....

2. ....

3. ....

(*c*) This is a diagram showing principle of a hydraulic press. The radius of the side A is 10 cm and radius of the side B is 25 cm.



(*i*) What is the ratio of weight on 'B' to the weight on 'A' if the level remains the same ?

....

....

(*ii*) A 10 kg weight is placed on the piston of side 'A'. What weight must be added on the piston of side 'B' to make the level same ?

....

....

(*iii*) What is the pressure at A ?

....

....

(*iv*) What is the pressure at B ?

....

....

7. (*a*) Express one atmosphere of pressure in N/m^2.

....

....

(*b*) An average man is constantly subjected to a pressure of.................................over his body.

(*c*) Nose bleeding may occur often at high altitude . Why ?

....

....

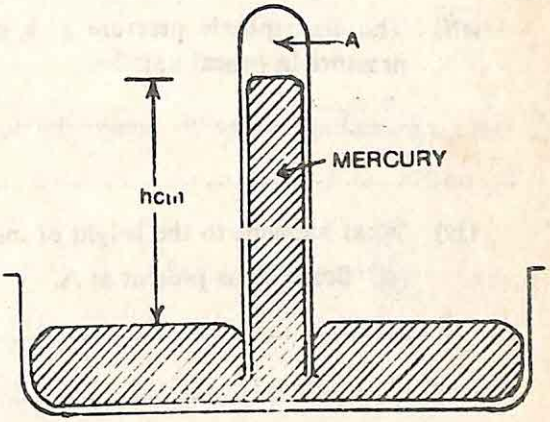
(*d*) Explain why cabins of aeroplane are pressurised.

....

(*e*) Fountain pen leaks at high altitude. Why ?

8. (*a*) Name an instrument which is used to measure atmospheric pressure.

(*b*) The diagram shows simple barometer.



(*i*) How are you going to ensure that the tube is vertical ?

(*ii*) What is the length of the tube ?

(*iii*) Why is the meniscus in the tube convex ?

(*iv*) What do you expect 'A' to be ?

(*v*) What happens to the mercury level if the tube is gradually tilted ?

(*vi*) Why does mercury stay at a fixed height ?

……………………………………………………………………………………

……………………………………………………………………………………

(*vii*) The height of mercury column in a barometer is say 76 cm. What happens if we take tube of double diameter.

……………………………………………………………………………………

……………………………………………………………………………………

(*viii*) The atmospheric pressure at a given place is 73 cm of Hg. What is the actual pressure in pascal unit ?

……………………………………………………………………………………

……………………………………………………………………………………

(*ix*) What happens to the height of mercury column in a barometer if :

(A) Some air is present at A.

……………………………………………………………………………………

……………………………………………………………………………………

(B) Some water vapour is present at A.

……………………………………………………………………………………

……………………………………………………………………………………

(C) It is taken to a mine.

……………………………………………………………………………………

……………………………………………………………………………………

(D) It is taken at altitude.

……………………………………………………………………………………

……………………………………………………………………………………

(E) Air is blown across the surface of mercury in the container.

……………………………………………………………………………………

……………………………………………………………………………………

(*x*) What is the minimum length of the tube required if we use water instead of mercury :

……………………………………………………………………………………

....

(*xi*) Give two reasons for the choice of mercury as a barometric liquid.

....

....

(*xii*) Give three disadvantages of a simple barometer.

....

....

....

(*c*) Aneroid barometer makes use of air in place of liquid. What is indicated on the scale on

(*i*) Stormy day :

....

(*ii*) Fine weather day :

....

9. (*a*) A mercury barometer reads 76 cm. By introducing some air the level reduces by 4 cm. The area of cross-section of the tube is 1 cm^2. Length of the tube above the surface of the mercury in the container is 85 cm. Calculate the pressure and volume of the trapped air.

....

....

....

....

(*b*) At a certain altitude the atmospheric pressure is 50652 N/m^2. How high is that point above the earth's surface ?

....

....

10. (*a*) State Boyle's law.

....

....

(*b*) What is the shape of graph between

(*i*) P and V ....

(*ii*) P and 1/V ....

(*c*) A hydrogen gas balloon with 'V' volume ascends and floats at an altitude where its volume doubles. Calculate the atmospheric pressure at that altitude. Take pressure on the earth surface as 76 cm of Hg.

....

....

11. (*a*) State Charle's law.

....

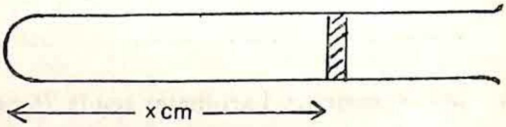
....

(*b*) Volume of gas at 27°C is 30 cm^3. At which temperature is its volume 70 cm^3.

....

....

(*c*) The adjoining diagram shows a simple gas thermometer. The length of the gas column is x cm at 27°C. What will be its length at 87°C, pressure remaining constant ?



....

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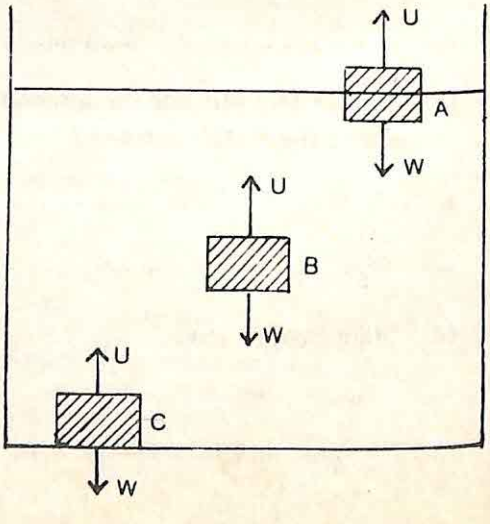
(*d*) What is the effect of pressure on boiling point of water ?

....

....

12. (*a*) The diagram shows three objects A, B and C acted upon by two forces, upthrust U and weight of the object W. In which case is



(*i*) U>W ....

(*ii*) U<W ....

(*iii*) U=W ....

(*b*) State Archimedes' principle.

....

....

(*c*) Give one example for the case when

(*i*) U>W ....

(*ii*) U<W ....

(*iii*) U=W ....

(*d*) Explain the following :

(*i*) A ship sinks to a greater depth in river water than in sea water.

....

....

(*ii*) Icebergs floating in the sea are dangerous for the ships.

....

....

(*iii*) A balloon filled with hydrogen gas rises up while a balloon filled with carbon dioxide gas does not rise.

....

....

13. (*a*) A piece of wood of volume 10 cm^3 displaces 7 cm^3 of water. What is the density of the wood ?

....

....

(*b*) A wooden plank 3·0 m long and 2·0 m wide is floating in fresh water of density 1000 kg/m^3. When some load is put on the plank it sinks by 2 cm. What is the mass of the load ?

....

....

....

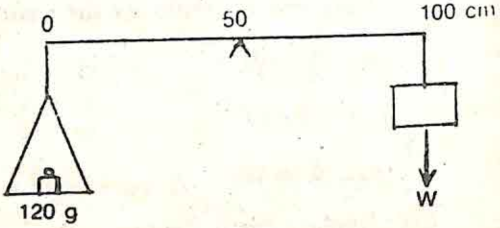
(*c*) A block of wood floats in water with two-thirds of its volume submerged. In oil it has 0·90 of its volume submerged. Find the density of the wood and the oil.

....

....

....

14. (*a*) **With the help of information given in the diagrams, calculate the relative density of the solid which can sink in water.**



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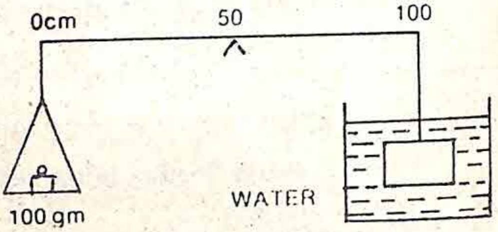

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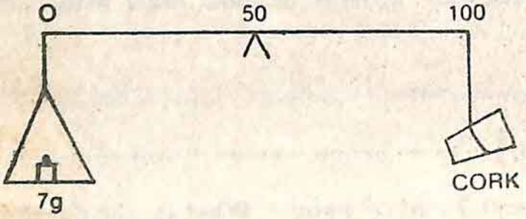
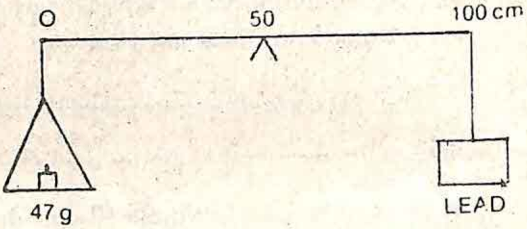
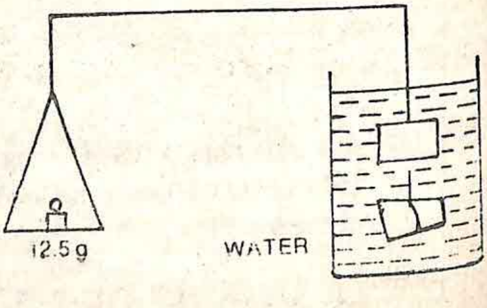
....

(*b*) **With the help of information given in the diagrams calculate the relative density of the cork.**







....

....

....

15. (*a*) The diagram shows a simple hydrometer.

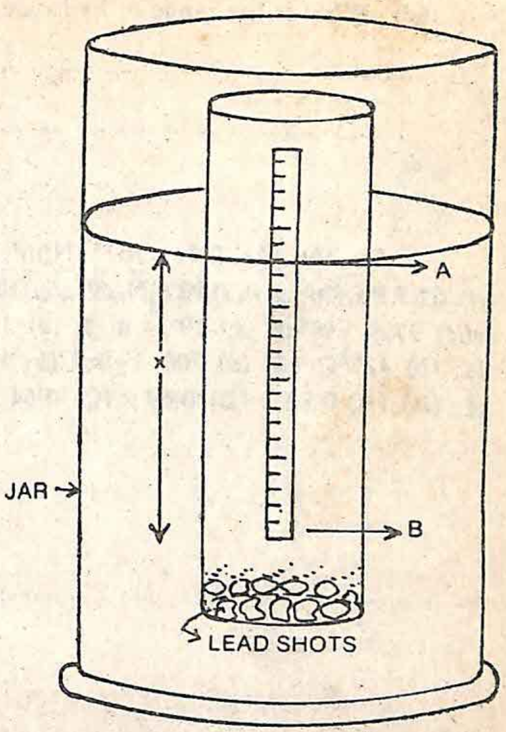
(*i*) What is measured with a hydrometer ?

....

(*ii*) On which principle does it work ?

....

....



(*iii*) Why do we put lead shots ?

....

(*iv*) When the hydrometer is dipped in petrol it sinks upto mark A and when dipped in glycerine it dips upto mark B. In terms of depth 'x' how much it can dip in

(A) Milk : ....

....

(B) Turpentine Oil : ....

....

(C) Methyl Alcohol : ....

....

(*b*) A hydrometer which is designed to measure specific gravity in range 1·015 to 1·045 is called as....................and is used to measure specific gravity of......................

(*c*) State the factors on which the accuracy and sensitivity of hydrometer depend.

....

....

(*d*) What is the range of hydrometer used to measure specific gravity of battery acid ?

....

....

ANSWERS

2. (*a*) 3N, (*b*) $0{\cdot}61 \times 10^{+4}$ N/m^2, $0{\cdot}49 \times 10^4$ N/m^2 3. (*b*) $4{\cdot}9 \times 10^4$ N/m^2 6. (*c*) (*i*) 6 : 1 (*ii*) 62 5 kg (*iii*) $3{\cdot}12 \times 10^{-8}$ N/m^2 (*iv*) $3{\cdot}12 \times 10^{-5}$ N/m^2 7. (*a*) 101292 8 N/m^2 8. (*b*) (*vii*) 19 cm, (*viii*) 9729 4 N/m^2 (*x*) $10{\cdot}34$ m 9. (*a*) 13 cm^3, 4 cm of Hg, (*b*) $7948{\cdot}5$ m 10. (*c*) 38 cm of Hg 11. (*b*) 427°C 13. (*a*) 700 kg/m^3 (*b*) 120 kg (*c*) $0{\cdot}67$ g^3/cm, $0{\cdot}74$ g/cm^3 14. (*a*) 6 (*b*) $0{\cdot}17$ 15. (*iv*) (A) 0 82 x (B) $0{\cdot}69$ x (C) $0{\cdot}64$ x.

□ □

6

Thermal Expansion of Solids, Liquids & Gases

1. (*a*) Define :

Linear expansion ; ....

....

One example : ....

Superficial expansion : ....

....

One example : ....

Cubical expansion ....

....

One example ....

(*b*) (*i*) What is a thermostat ?

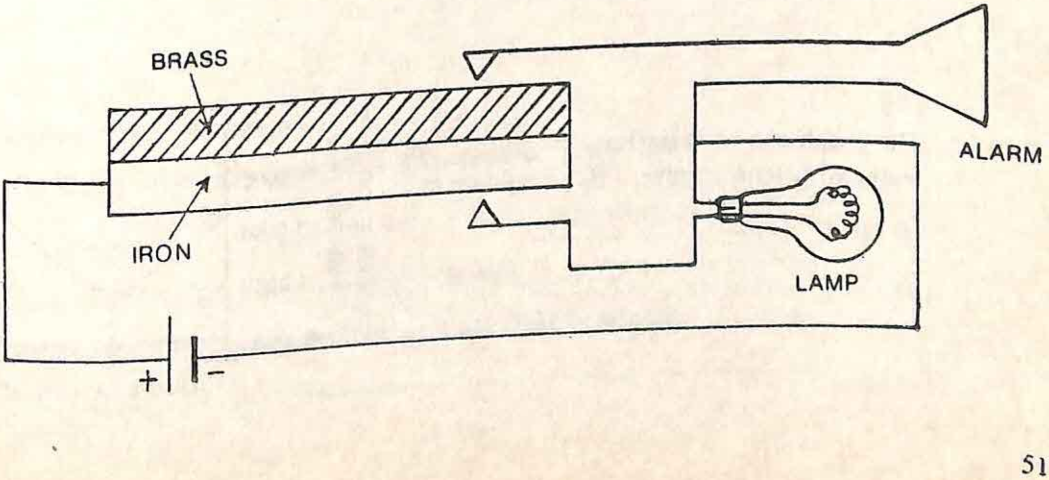
....

(*ii*) Name four electrical appliances which make use of a thermostat.

....

....

(*iii*)



The circuit shows an alarm and a lamp alongwith a bimetallic strip. What happens when

(*i*) the strip is heated. ....

....

(*ii*) the strip is cooled. ....

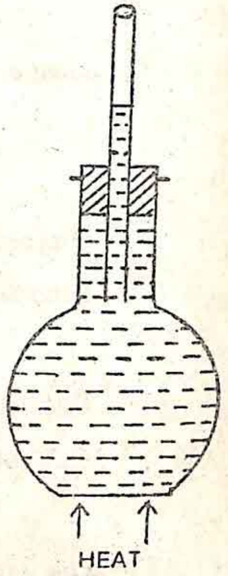
....

(*c*) The diagram shows a flask fitted with thin long tube. When the flask is heated the level in the tube first falls and then rises. Why ?

....

....

....



(*d*) State whether the following quantities will increase, decrease or remain unchanged when an iron washer is heated.

(*i*) Volume : ....

(*ii*) Internal diameter : ....

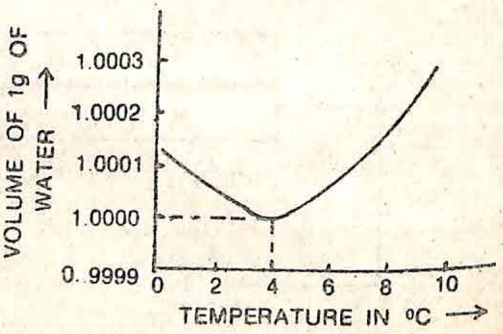
(*iii*) External diameter : ....

(*iv*) Density : ....

2. (*a*) The graph shows variation of volume of water with temperature. Read volume at

(*i*) 0° C.......................................

(*ii*) 4° C.......................................



Calculate density at

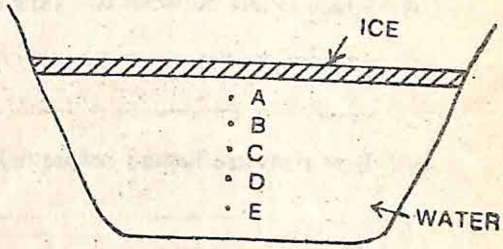
(*iii*) 0° C : ....

....

(*iv*) 4° C : ....

....

(*b*) The adjoining diagram shows a pond covered with ice. Write down temperature at



(*i*) A. .... B. .... C. .... D. .... E. ....

(*ii*) Will the temperature at A, B, C, D, E remains the same or vary under same conditions ? Why ?

....

....

(*iii*) What do you mean by anomalous expansion of water ?

....

....

(*iv*) Does this help in any way ?

....

....

(*v*) What is the disadvantage of such expansion ?

....

....

3. Explain the following :

(*i*) Water pipes may burst during extreme cold weather.

....

....

(*ii*) Electric wires sag in summer and are tight in winter.

....

....

(*iii*) When hot tea is poured in the glass tumbler it cracks.

....

....

....

(*iv*) Space is left between two rails of railway line.

....

....

(*v*) Iron rims are heated before fixing on cart wheels.

....

....

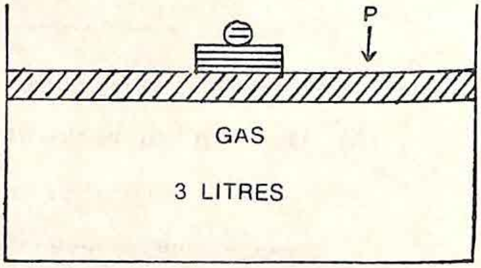
(*vi*) A metal screw cap on a glass jam bottle is screwed on too tightly. It is made loose by dipping in hot water for some time.

....

....

....

4. The container fitted with movable piston contains 3 litres of a gas at 27° C.



(*i*) Temperature is kept constant, calculate the new volume when pressure is doubled.

....

....

(*ii*) Volume is kept constant, calculate the new pressure when temperature is 127° C

....

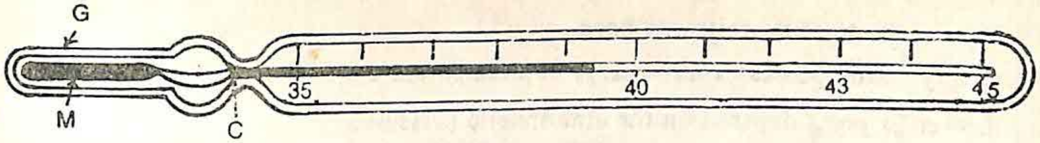
....

(*iii*) Pressure is kept constant, calculate the new temperature when volume is 5 litres.

....

....

5. The diagram represents a clinical thermometer.



(*i*) Name the parts C : ....

G : ....

M : ....

(*ii*) The thermometric substance used is..

The thermometric property employed is..

....

(*iii*) State two limitations of the property mentioned in (*ii*)

....

....

(*iv*) Why is the bulb of a thermometer made of thin glass ?

....

....

(*v*) What is the role of 'C'.

....

....

(*vi*) The thermometer is given some jerks in order to re-set it. Why ?

....

....

(*vii*) What is the normal temperature of human body in °C. ....

(*viii*) Which thermometer is more sensitive, the one with spherical bulb or the one with cylindrical bulb. Why ?

....

(*ix*) How can sensitivity of a thermometer be increased ?

....

....

6. Some properties regarding celsius and kelvin temperature scales are given in a mix form. Choose the properties and write in the table given below.

(*i*) Lower fix point is arbitrarily fixed.

(*ii*) Every matter possesses zero energy at a temperature 0°.

(*iii*) Lower fix point depends on the atmospheric pressure.

(*iv*) Linear expansion is the thermometric property employed.

(*v*) 0·01° C is the triple point temperature of water decided as the upper fix point.

(*vi*) Substance as long as is in liquid state can be used as a thermometric substance.

(*vii*) It is independent on thermometric substance.

(*viii*) The correct upper fix point is only possible if pure water boils at normal pressure.

Celsius scale	*Kelvin scale*
....	....
....	....
....	....
....	....
....	....

7. (*a*) **Determine the temperature which is indicated by the same number of Celsius and Fahrenheit scale.**

....

....

(*b*) **The distance between two fix points of a mercury thermometer is ‘l’. Calculate the unknown temperature if mercury rises to $0.7\,l$.**

....

....

(*c*) **Convert**

(*i*) **15° C to Kelvin temperature.**

....

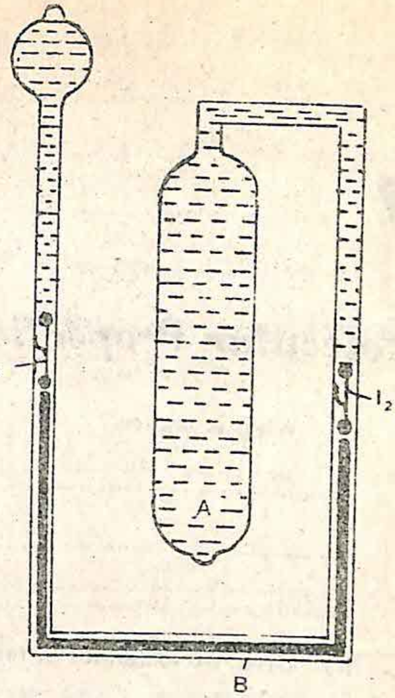
(*ii*) **15° C to Fehrenheit temperature.**

....

(*iii*) 15 K to °C.

....

8. The adjoining figure shows a Six's maximum and minimum thermometer.



(*i*) What are liquids A. ....

B. ....

(*ii*) Name I_1, I_2

....

(*iii*) Material used to make I_1 I_2 is

....

(*iv*) How do we re-set the thermometer ?

....

(*v*) Which index measures maximum temperature ?

....

(*vi*) Which index measures minimum temperature ?

....

(*vii*) Mark the temperature on the side of column of I_1, I_2.

....

ANSWERS

2. (*a*) (*i*) 1·00014 cm^3 (*ii*) 1·0000 cm^3 (*iii*) 0·99986 g/cm^3 (*iv*) 1 g/cm^3 4. (*i*) 1·5 litres (*ii*) $\frac{4}{3}$ P (*iii*) 227° C 7. (*b*) 70° C (*c*) (*i*) 288 K (*ii*) 59° F (*iii*) −258° C.

7

Molecular Properties of Matter

1. (*i*) What is matter ?

....

....

....

(*ii*) Give two examples of matters.

....

....

(*iii*) State three properties of matter.

....

....

(*iv*) Name the states of matter.

....

....

....

(*v*) What is the composition of matter ?

....

....

(*vi*) In which state are the molecules closely packed ?

....

(*vii*) Name the state in which the molecules have least attraction.

....

(*viii*) Can a molecule be further divided, if so what is the smallest part called ?

....

(*ix*) What is a composition of the smallest part which you named in (*viii*) ?

....

....

2. A beam of sun-light enters through a small opening in a dark room. It is observed that dust particles float in a random way.

(*i*) Name the phenomenon.

....

(*ii*) In which states of matter can it take place ?

....

....

(*iii*) Why is this phenomenon fast in case of matter which is composed of lighter particles ?

....

....

(*iv*) If the room is heated, what changes do you note in the motion of dust particles ?

....

....

3. On the basis of kinetic theory, write in descending order the following properties for the three states of matter :

(*i*) Kinetic energy.

....

(*ii*) Force of attraction.

....

(*iii*) Separation between molecules.

....

(*iv*) Density.

....

4. Smell of burning dhoop-stick can be sensed in every part of a room.

(*i*) What property of matter is involved in it ?

....

....

(*ii*) Define the property.

....

....

....

(*iii*) Give one example which can hold the above property for the following combination :

(*a*) Gas-Gas : ....

(*b*) Gas-Liquid : ....

(*c*) Liquid-Liquid : ....

(*d*) Liquid-Solid : ....

(*e*) Solid-Solid : ....

(*f*) Solid-Gas : ....

(*iv*) How is the rate of the above-mentioned property for gases affected by :

(*a*) the density of gas ?

....

....

(*b*) the temperature of gas ?

....

....

(*v*) "The diffusion in case of liquids is much slower than in gases." Justify the statement.

....

....

5. (*a*) Distinguish between the term melting and freezing ?

....

....

(*b*) **Give two factors affecting the melting point of a solid.**

....

....

(*c*) Give one example of solid which

expands on melting : ....

shrinks on melting : ....

(*d*) Write whether kinetic energy per molecule increases/decreases/remains the same, in case of

melting : ....

freezing : ....

6. (*a*) A few drops of spirit are placed on the palm of hand.

(*i*) It disappears soon. Why ?

....

....

(*ii*) The palm is cooled. Why ?

....

....

(*iii*) What type of liquid is spirit ?

....

....

(*iv*) Give three factors which affect the rate of evaporation of a liquid.

....

....

....

(*b*) Explain why ?

(*i*) A sweating person prefers to sit under fan.

....

....

(*ii*) Clothes dry faster on a windy day.

....

………………………………………………………………………………………

(c) State two differences between evaporation and boiling.

………………………………………………………………………………………

………………………………………………………………………………………

(d) Which of the two—evaporation and boiling—require less time ?

………………………………………………………………………………………

………………………………………………………………………………………

☐ ☐

8

Calorimetry

1. (*a*) What is the difference between heat and temperature ?

....

....

(*b*) Define Kilo calorie.

....

....

(*c*) (*i*) 1 cal. = ... J.

(*ii*) Thermal capacity = ... × ....

(*iii*) Specific heat capacity = ...

(*d*) State the principle of calorimetry.

....

....

(*e*) Define specific heat capacity.

....

....

2. (*a*) A 0·5 Kg of a metal at 75°C is dropped in water of mass 0·7 Kg at 25°C. The final temperature is 29°C. Calculate the specific heat capacity of the metal.

....

....

(*b*) To 3 litres of water at 20°C, 2 litres of water at 55°C, is added. Calculate the final temperature.

....

....

(*c*). How many kilograms of a liquid of specific heat capacity of 2480 J/Kg.°C at a temperature 40°C must be mixed with 0·7 Kg. of a liquid of specific heat capacity 4200 J/Kg.°C at 20°C, so that the final temperature of the mixture becomes 32°C ?

....

....

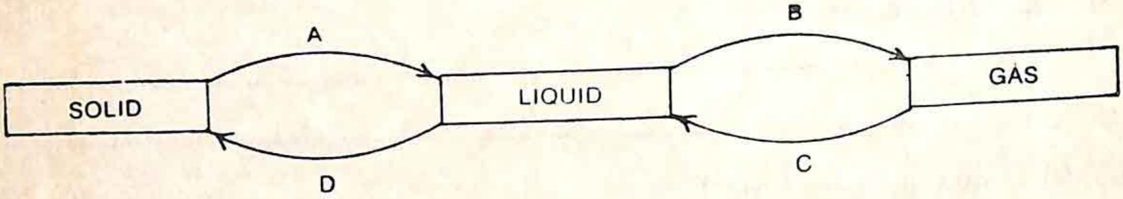
....

(*d*) 350 g of a metal radiates 3000 J of heat when cooled from 109°C to 21°C. Calculate the specific heat capacity of the metal.

....

....

....



(*i*) Name the process.

A. .... B. ....

C. .... D. ....

(*ii*) Under normal pressure write the pairs which occur at the same temperature.

Pair 1 .... Pair 2 ....

(*iii*) What is the effect at pressure on process A ?

....

(*iv*) Give one example to show that increase in pressure can cause the process A.

....

....

....

(*v*) Does volume change when the process A takes place ?

....

(*vi*) Give an example of decrease in volume of matter for case (*v*).

....

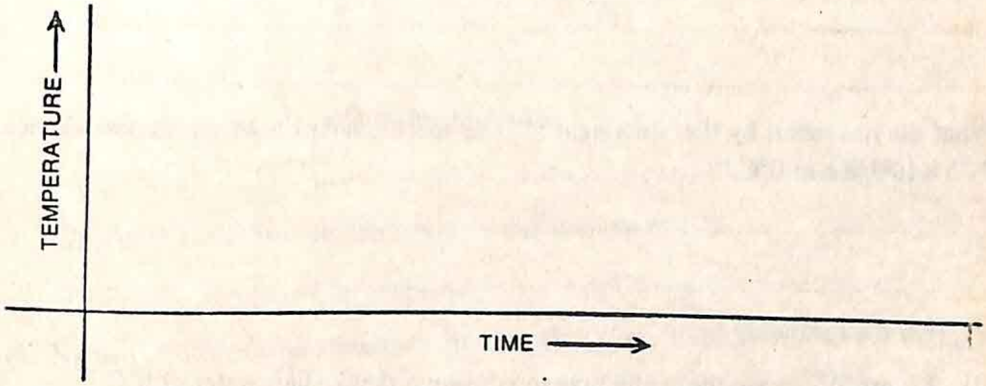
(*vii*) Does the process B accelerates by increasing pressure ? Give reason.

....

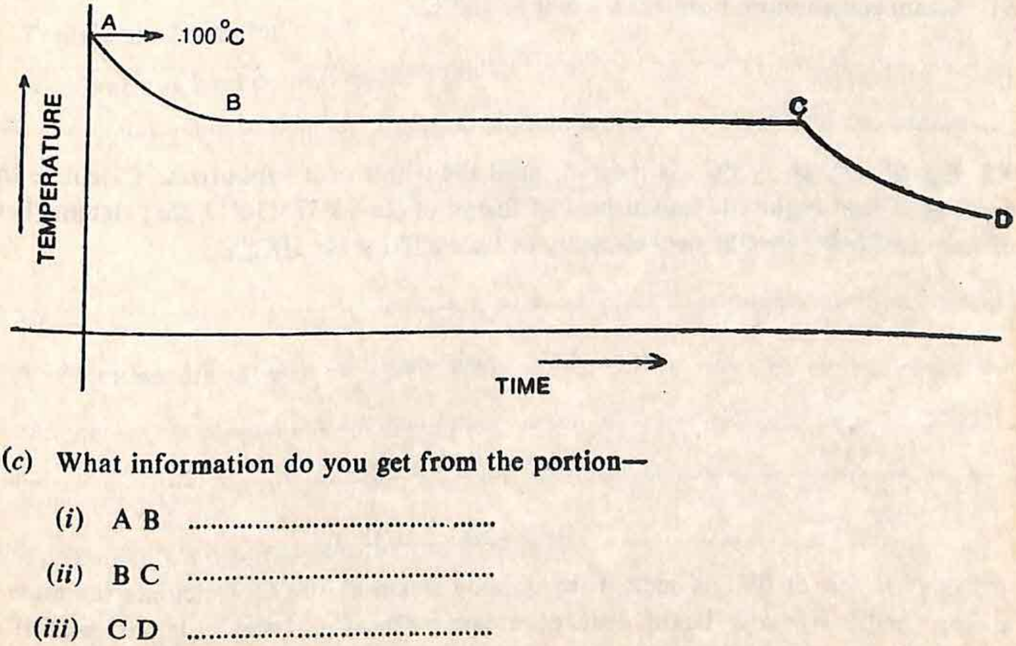
....

....

4. (*a*) 5 Kg. of pure ice at —5°C is heated until it converts into steam. **Draw the graph of temperature against time.**



(*b*) A certain mass of naphthalene is cooled from 100°C till it completely solidifies. The temperature time graph is shown below.



(*c*) What information do you get from the portion—

(*i*) A B ....

(*ii*) B C ....

(*iii*) C D ....

(*iv*) Mark on the graph the melting point of Naphthalene.

5. (*a*) Define :

(*i*) Specific latent heat of Fusion.

....

....

(*ii*) Specific heat of vaporisation of water.

....

....

....

(*b*) What do you mean by the statement : "The specific latent heat of fusion of ice is $3·35 \times 10^5$ J/Kg at 0°C."

....

....

(*c*) Explain the following :

(*i*) Lumps of ice are more effective in cooling a drink than water at 0°C.

....

....

(*ii*) Steam causes more burn than water at 100°C.

....

....

6. (*a*) 0·5 Kg of ice at −5°C is heated until the whole of it vapourizes. Calculate the amount of heat required. Latent heat of fusion of ice$=3·34 \times 10^5$ J/Kg ; latent heat of steam$=22·68$; specific heat capacity of ice$=0·021 \times 10^5$ J/Kg°C.

....

....

....

....

....

(*b*) 1·5 Kg of ice at 0°C is melted by passing steam at 100°C Calculate the mass of steam used ? (specific latent heat of steam=2268 J/g, specific latent heat of ice =336 J/g and specific heat capacity of water=4200 J/Kg°C.)

....

....

....

7. (*a*) State the principle of cooling produced in a refrigerator.

....

....

(*b*) Why is the cooling system kept at the top of a refrigerator ?

....

....

(*c*) Name a gas which is used as refrigerant.

....

(*d*) Why does the motor switch off-on at regular interval ?

....

(*e*) Name the device which controls the on-off of the motor.

....

(*f*) Is it wise to keep hot things in the refrigerator ?

....

8. Explain the following :

(*i*) Water is kept cool in earthen pot.

....

....

....

....

(*ii*) Clothes dry faster on a windy day.

....

....

(*iii*) Petrol if left open, dries in a certain time.

....

....

9. An electric heater of power 600 w raises the temperature of 5·0 Kg of a liquid from 25°C to 40°C in 100 sec. Calculate :

(*i*) The heat capacity of 5·0 Kg. of liquid.

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

(*ii*) The specific heat capacity of the liquid.

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

ANSWERS

2. (*a*) 511·37 J/kg°C (*b*) 34°C (*c*) 1·78 kg (*d*) 97·40 J/kg°C 6. (*a*) 1516250 J (*b*) 222 gm
9. (*i*) 4000 J/°C (*ii*) 800 J/kg°C.

□ □

9

Transmission of Heat

1. (*a*) For the three modes of transfer of heat—

(*i*) Which is a slow process ?

....

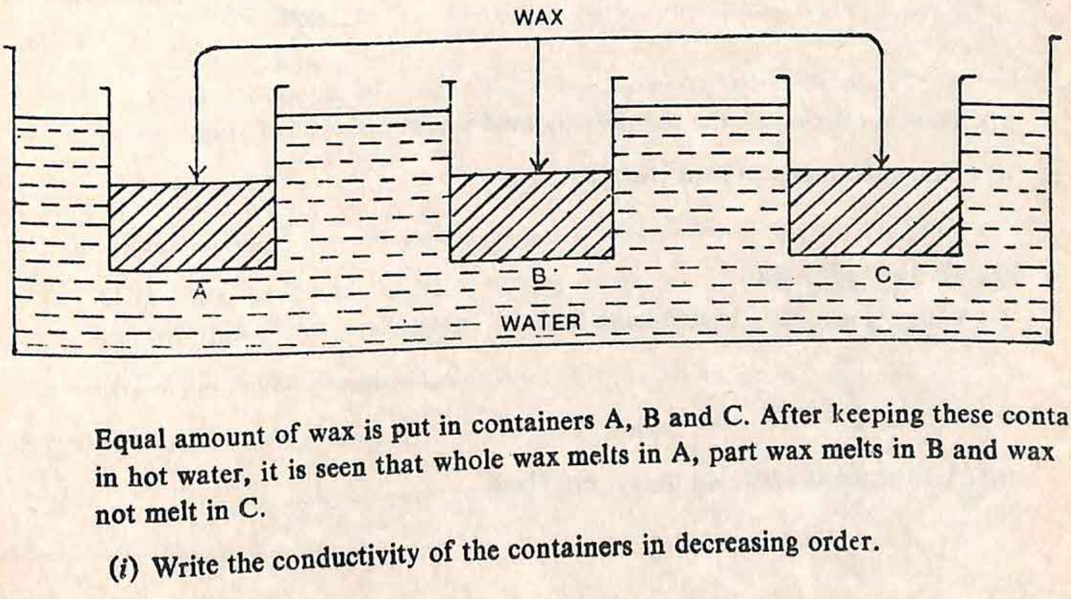
(*ii*) In which mode do molecules transport heat ?

....

(*iii*) Which mode does not require medium ?

....

(*b*)



Equal amount of wax is put in containers A, B and C. After keeping these containers in hot water, it is seen that whole wax melts in A, part wax melts in B and wax does not melt in C.

(*i*) Write the conductivity of the containers in decreasing order.

....

(*ii*) Which is a poor conductor of heat ?

....

(*c*) Explain the following :

(*i*) Cooking utensils are provided with wooden handle.

....

....

(*ii*) Vacuum is created between the walls of a flask.

....

....

(*iii*) Generally cooking utensils are blackened at the bottom.

....

....

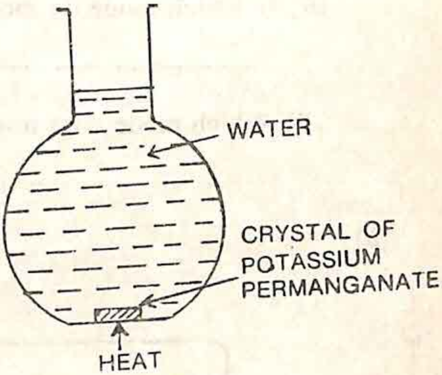
2. (*a*) (*i*) What is your observation when the flask is heated ?

....

....

....

....



(*ii*) Mark on the figure the path of coloured water.

(*iii*) Name the mode of heat transfer.

....

(*b*) Explain the following :

(*i*) Water is generally heated from below :

....

....

(*ii*) A chimney is provided over a fire place.

....

....

(*iii*) Ash particles rise over a burning wood.

....

....

(*iv*) In a refrigerator the cooling unit is fitted near the top.

....

....

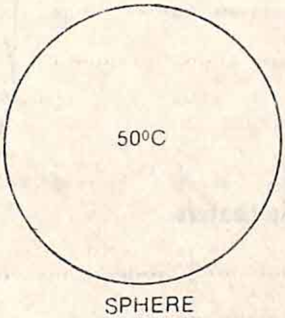
3. (*a*) Give three properties of Radiant heat rays.

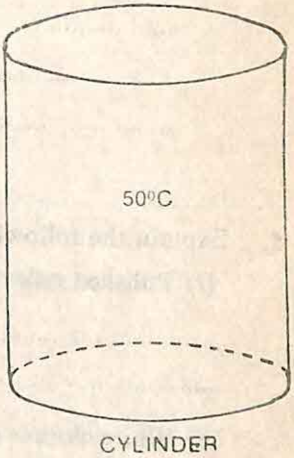
....

....

....

(*b*)



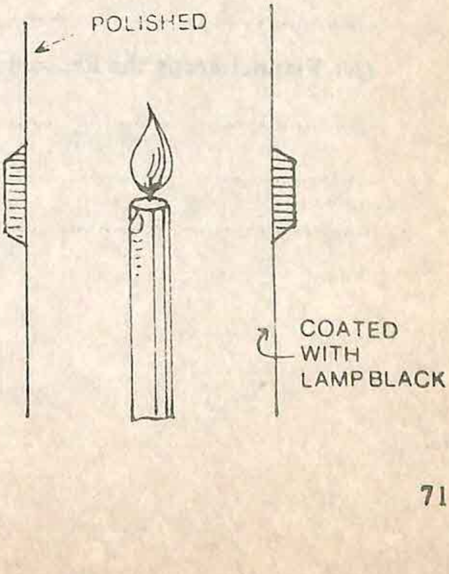


Two piece of copper of equal volume are shown in the figure above. Which is going to give more heat radiation per second and why ?

....

....

(*c*) Corks are fixed with a little melted wax on the two thin plates as shown in the diagram.



(*i*) What is your observation ?

....

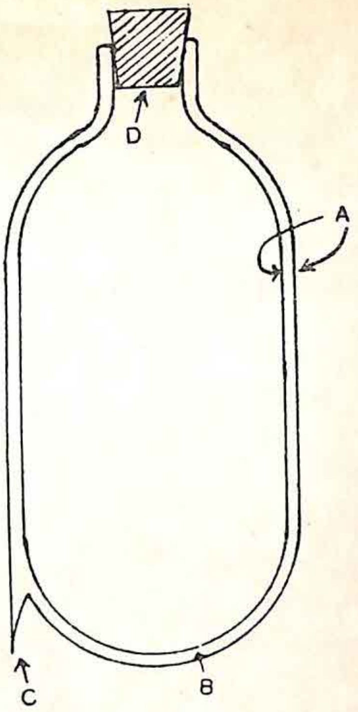
....

(*ii*) Give reason for (*i*).

....

....

4. (*i*) For a thermos flask label the parts A, B, C and D.



(*ii*) D reduces heat loss by

....

(*iii*) A reduces heat loss by

....

(*iv*) B reduces heat loss by

....

(*v*) Flask is made of double walled glass. Why ?

....

....

....

....

5. Explain the following :

(*i*) Polished reflectors are used in electric heaters.

....

....

(*ii*) White clothes are preferred in summer.

....

....

(*iii*) Green houses are made to protect plants.

....

....

(*iv*) Flannel keeps the ice cold but keeps people warm.

....

....

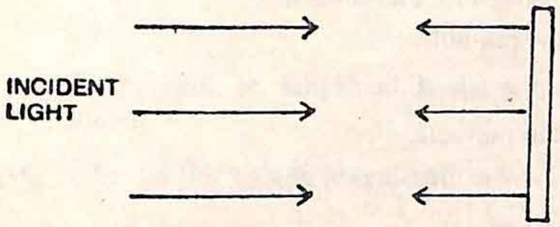
....

□ □

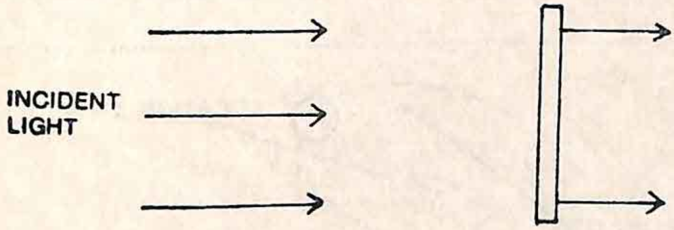
10

Rectilinear Propagation of Light ; Reflection

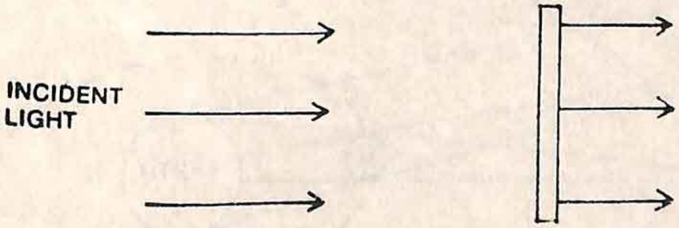
1. The diagrams below show three different objects which respond to the incident light separately. Name the type of object.



Object ....

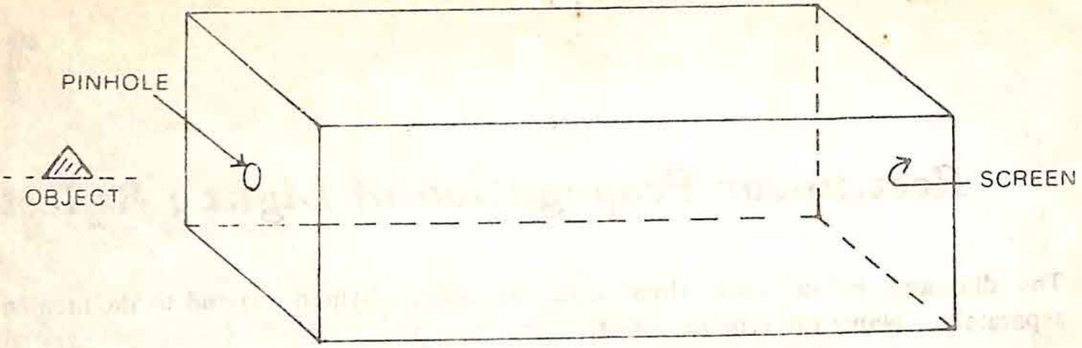


Object ....



Object ....

2. The diagram shows a pin-hole camera.



An image is obtained on the screen.

(*a*) Complete the ray diagram.

(*b*) What happens to the size of image and its sharpness if

(*i*) the object is brought near the pin-hole.

....

(*ii*) the screen is brought near the pin-hole.

....

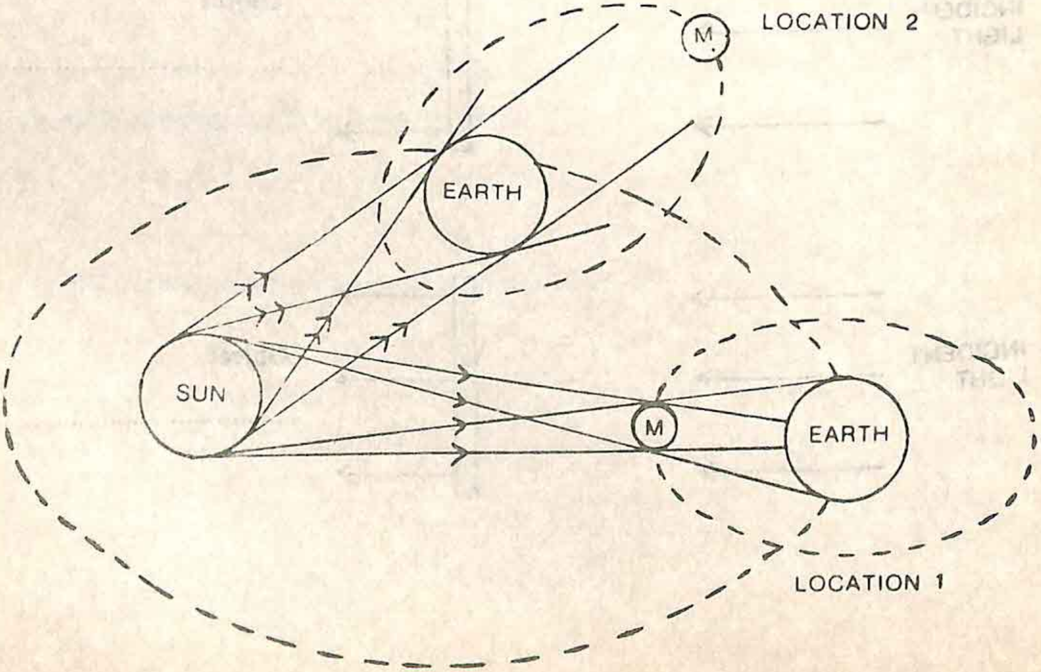
(*iii*) another hole is made near the first one.

....

....

....

3.



(*a*) The diagram (shown on p. 74) shows two locations of earth while revolving around the sun. Name the eclipse formed at

Location 1 : ....

Location 2 : ....

(*b*) What is the inclination of moon's orbit with respect to the earth's orbit ?

....

(*c*) (*i*) For the type of eclipse obtained at location 1, draw the area which is unde. total eclipse.

(*ii*) Why is this eclipse not occurring frequently ?

....

....

(*d*) In the type of eclipse at location 2, mark the positions where you can see half moon.

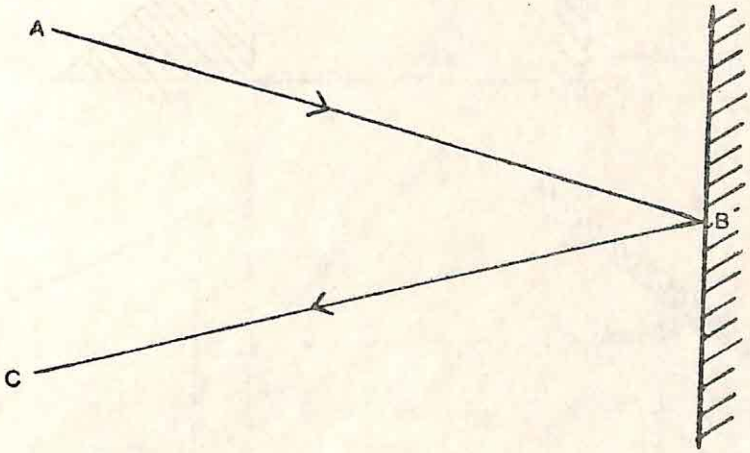
(*e*) Why has this eclipse long duration ?

....

....

....

4.



In the above diagram a ray of light takes the path ABC.

(*a*) Name the phenomena : ....

(*b*) Draw the normal : ....

(*c*) State the laws of the phenomena mentioned above.

....

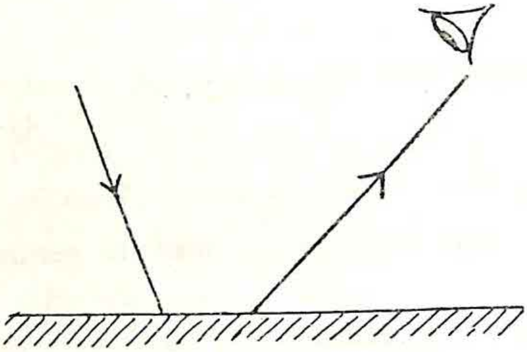
....

....

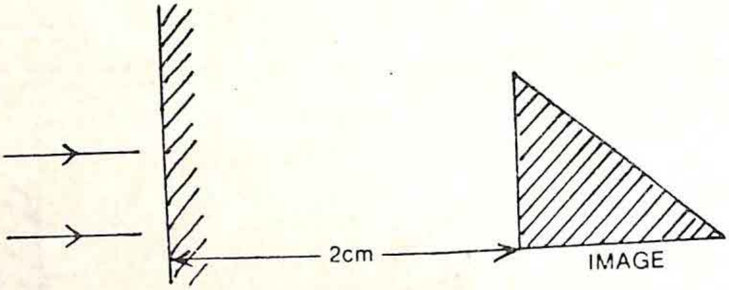
....

5. Complete the following ray diagrams.

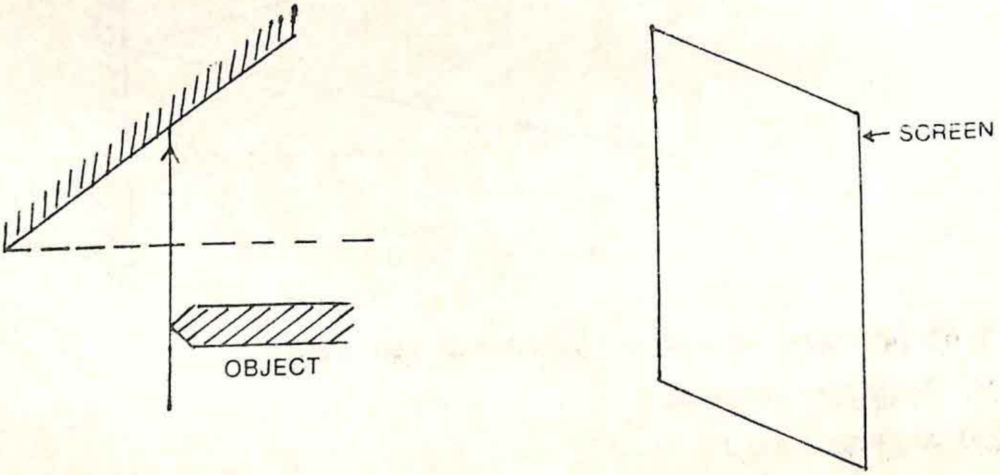
(*i*)



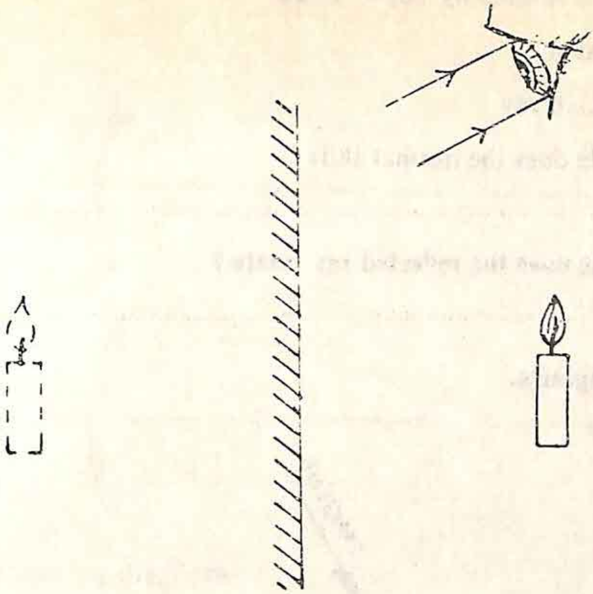
(*ii*)



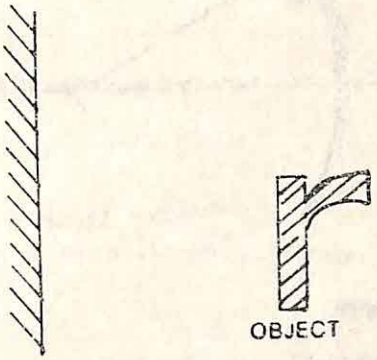
(*iii*)



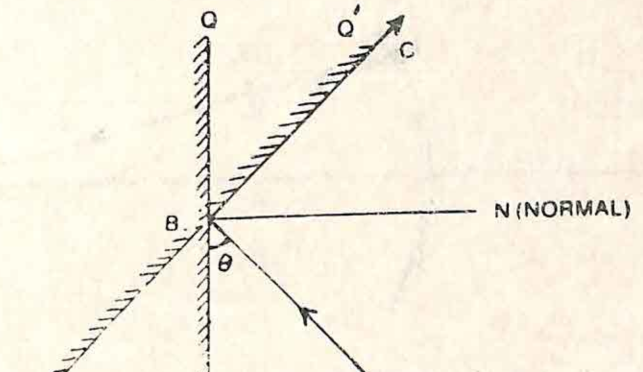
(*iv*)



(*v*)



6.



Initially when the mirror is kept at PQ position, the path of light is ABC.

(*i*) Note angle NBC : ....

Now mirror is rotated by angle. Draw

(ii) **The new normal.**

(iii) **Path of reflected ray.**

(iv) **By what angle does the normal shift ?**

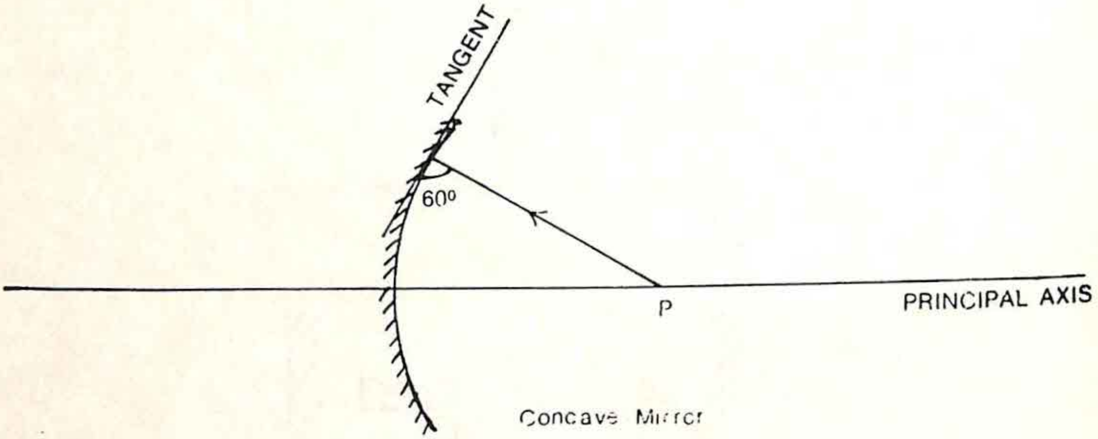
....

(v) **By what angle does the reflected ray rotate ?**

....

5. **Complete ray diagrams.**

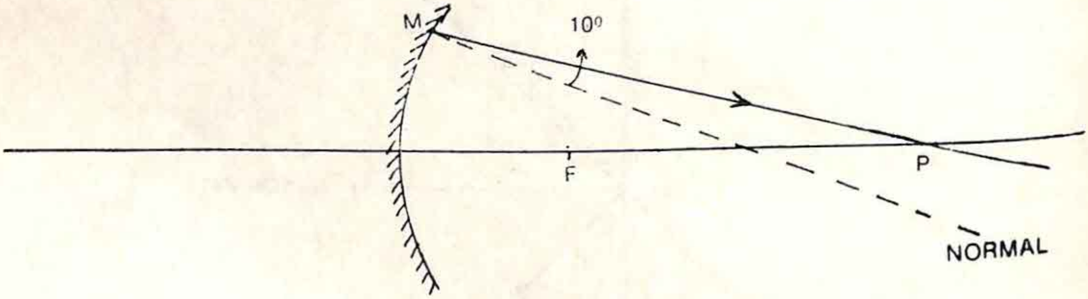
(a)



(i) **Mark angle of incidence.**

(ii) **Mark centre of curvature C.**

(b)

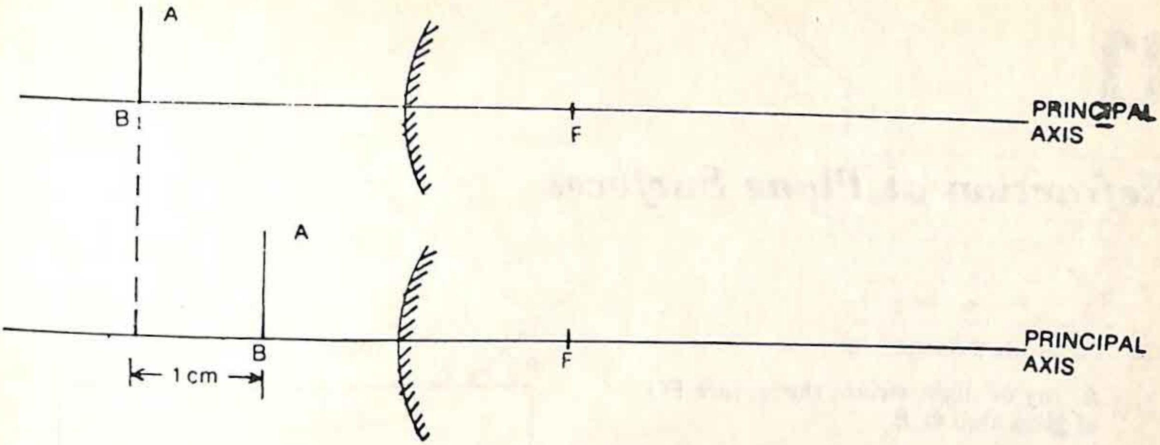


A point object is kept on the principal axis :

(i) **Locate the position of object.**

(ii) **Complete the ray diagram.**

8.



(*i*) Complete the above ray diagrams.

(*ii*) Measure the shift in images.

....

(*iii*) What is the nature of image formed.

....

....

(*iv*) If object is brought close to the convex mirror, then in which direction does the image shift ?

....

(*v*) Give one use of the above mirror

....

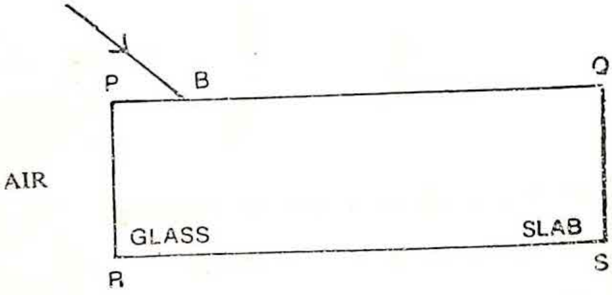
....

□ □

11

Refraction at Plane Surfaces

1. A ray of light strikes the surface PQ of glass slab at B.



(*a*) Complete the path of the light so that it is again back in the air medium.

(*b*) Mark angle of incidence, angle of refraction and angle of emergence.

(*c*) Define a relation between the angle of incidence and angle of refraction.

(*d*) Is there any relation between angle of incidence and angle of emergence ?

(*e*) State the laws of refraction.

(*f*) If the ray of light is incident on the surface RS when same anlge of incidence it is seen that light retraces its path. What is this principle called ?

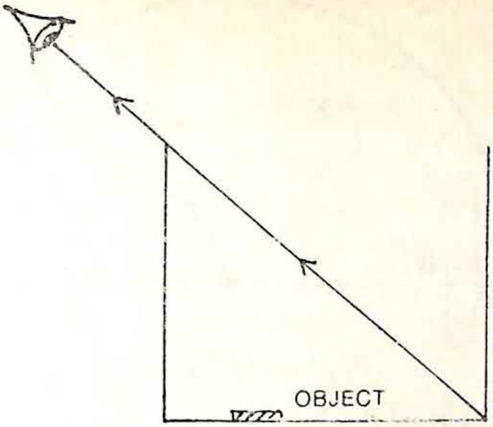


Fig 1

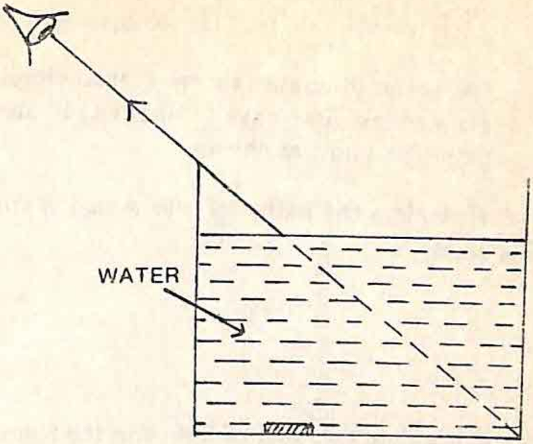


Fig 2

2. The above diagrams show that the bottom of a shallow vessel is viewed in such a way that the object is not seen. Now water is added and for a certain height of water the object is seen.

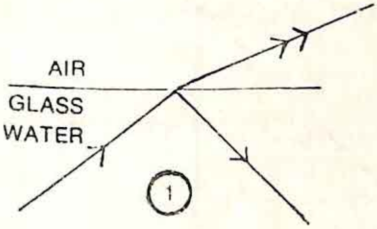
   Explain the above phenomena.

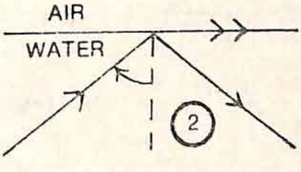
   ....

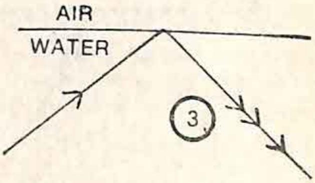
   ....

   Complete the ray diagram in figure 2.

3. Study the diagrams.







(*i*) Draw normal for each diagram.

(*ii*) Mark angle of incidence for each diagram.

(*iii*) What can you say about the angle of incidence for the diagram (2) ?

....

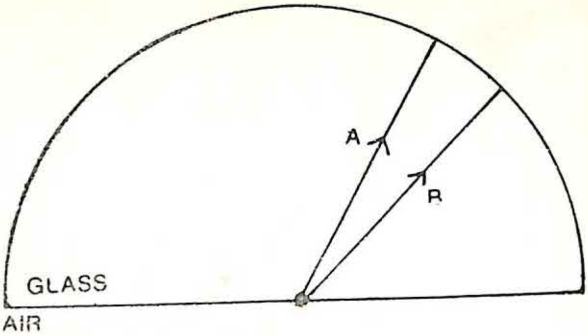
(*iv*) Name the phenomena when angle of incidence is,

(1) greater than I ....

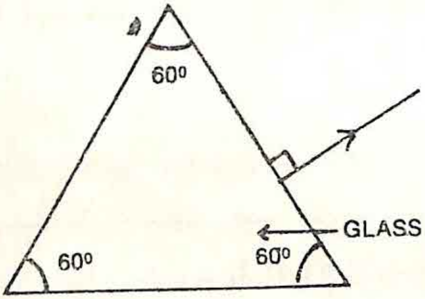
(2) less then I ....

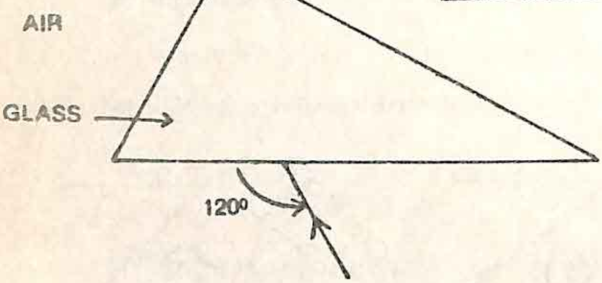
4. The given diagram shows a semi-circular glass block. Two rays of light (A, B) start, from the point as shown.

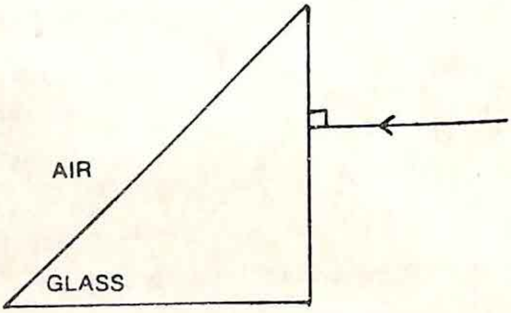
Complete the paths of rays A and B from glass to air.

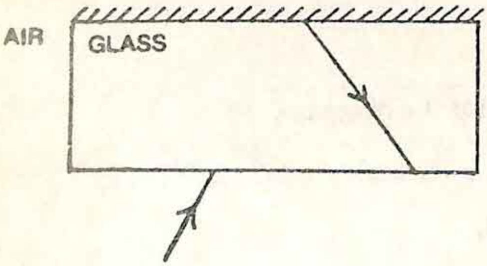


5. Complete the path of light for the following diagrams :

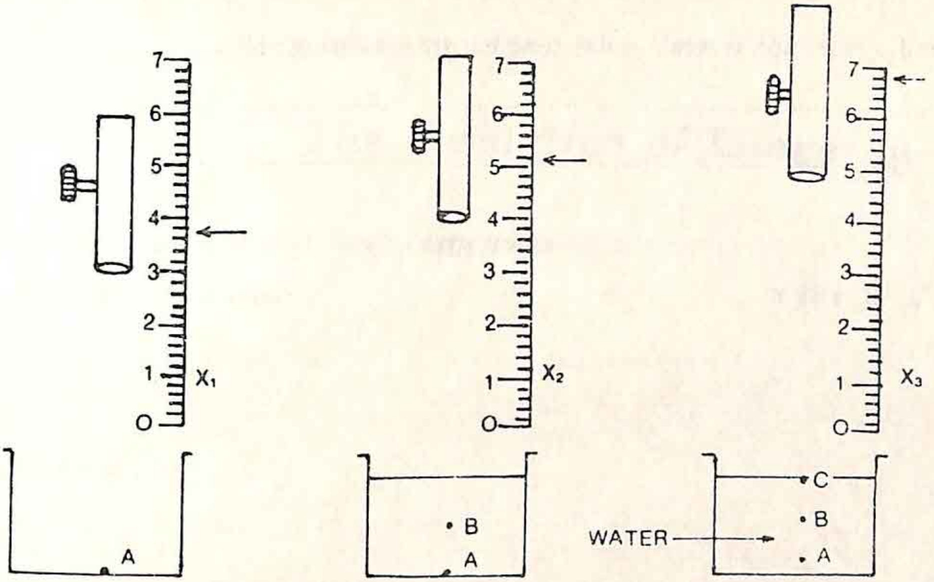








6. In the construction of a periscope prisms are preferred to mirrors for deviation of light rays. Why ?



7. The above diagram shows a travelling microscope where x_1 focus point A, x_2 focus point B and x_3 focus point C. Calculate the refractive index of water.

8. On viewing a pond vertically down, the apparent depth is 1·5 m. What is its real depth if refractive index of water be 1·33 ?

9. Explain the following :

(*i*) A fish under water can see the sun set.

(*ii*) In day time we cannot see the sun directly but in the evening we can see the red sun for longer time.

(*iii*) Why do stars twinkle ?

……………………………………………………………………………………………………

……………………………………………………………………………………………………

(*iv*) Radio reception is weak in day time but strong during night.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

ANSWERS

7. 1·3 8. 1·99 m.

□ □

12

The Formation of Images by Lenses

1. Give the meaning of the following terms, used for a lens :

(*a*) Radius of curvature.

....

....

(*b*) Focal point.

....

....

(*c*) Principal axis.

....

....

(*d*) Aperture.

....

....

....

(*e*) Optical centre.

....

....

....

(*f*) Secondary axis.

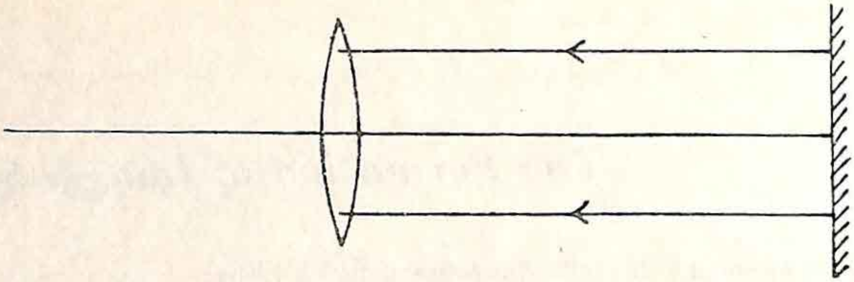
....

....

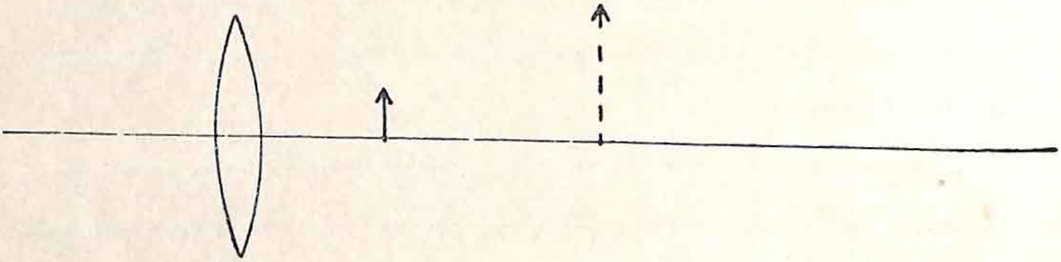
....

2. Complete the following ray diagrams:

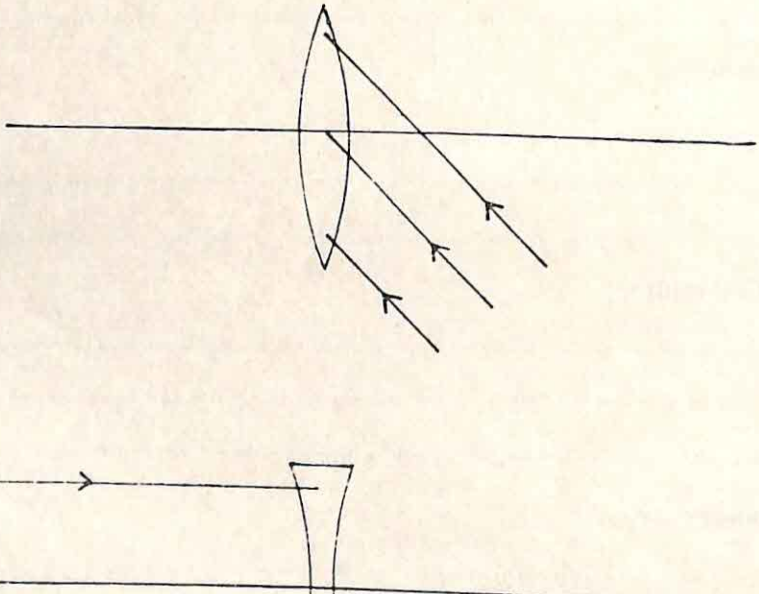
(*a*)



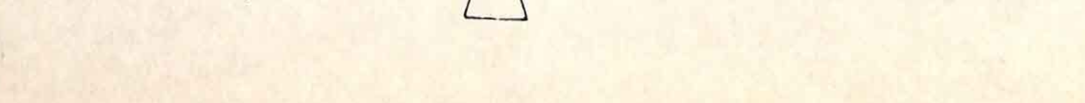
(*b*)



(*c*)

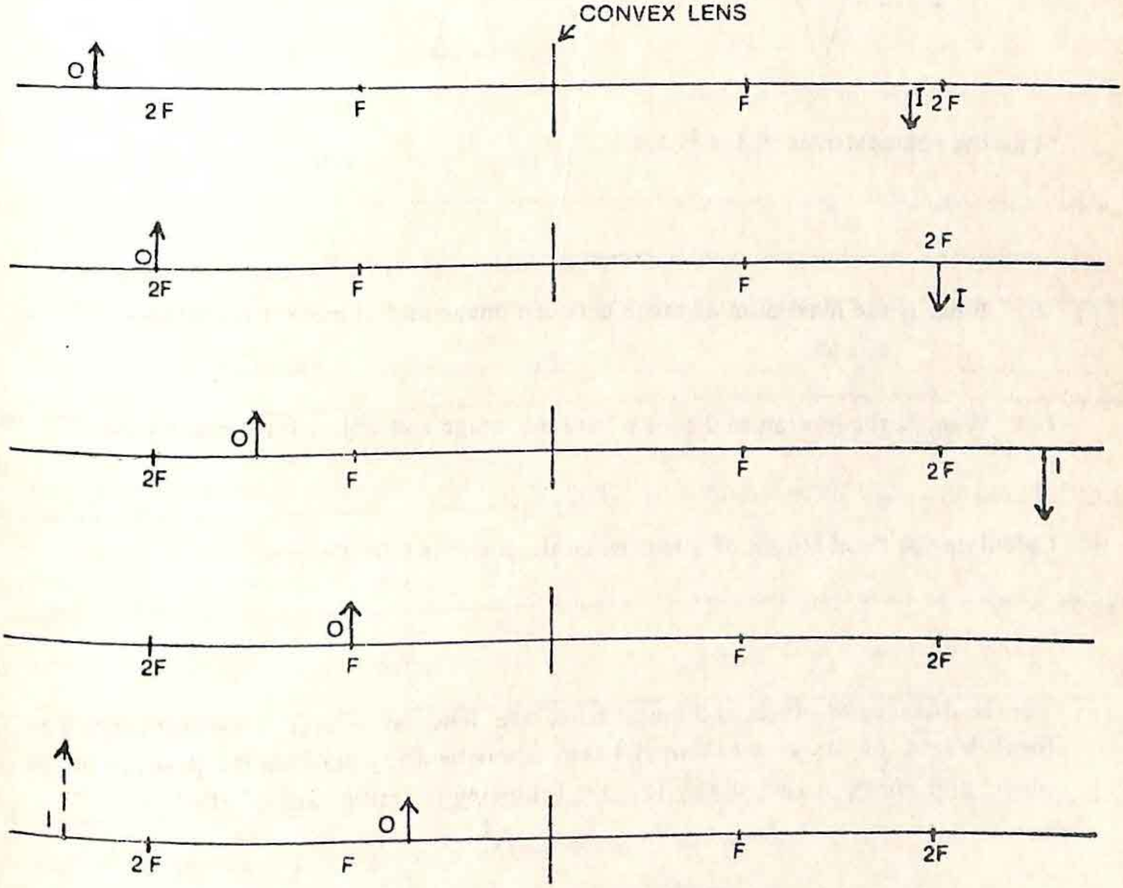


(*d*)



3. (*a*) In the diagrams below O is the object, I is the image and F is the Focal point. Complete the ray diagrams.

Nature of image formed



(*b*) Which of the above cases is utilized in

(*i*) Photographic camera : ……………………………………………………………

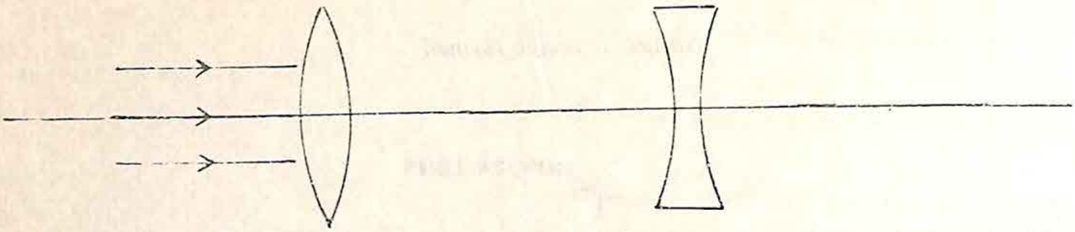
(*ii*) Slide projector : ……………………………………………………………

(*iii*) Reading lens. : ……………………………………………………………

(*iv*) Production of parallel beam of light : ……………………………………………

……………………………………………………………………………………………

4. (*a*) The diagram shows a beam of monochronatic ray of light directed towards a pair of lenses. Complete the diagram to show how the rays pass into and out of the lenses.



State the characteristic of the image.

....

....

(*b*) (*i*) What is the maximum distance between image and object for a convex lens ?

....

(*ii*) What is the minimum distance between image and object for a convex lens ?

....

(*c*) Calculate the focal length of a lens when its power is 0·05 Dioptre.

....

....

(*d*) Let the distance of object and image from the lens be x and y respectively. The focal length of the convex lens is 12 cm. Show by a ray diagram the position of the object and image in such a way that the following equations are satisfied.

$$x+y=54$$

$$xy=648.$$

5. (*a*) Explain the purpose of the following :

(*i*) Pupil : ....

....

(*ii*) Ciliary muscles : ....

....

(*iii*) Iris : ....

....

(*iv*) Retina : ....

....

(*v*) Yellow spot : ....

....

(*vi*) Vitreous humour : ....

....

(*b*) Give four similarities between a lens camera and eye.

The Camera	*The Eye*
1.	
2.	
3.	
4.	

6. (*a*) What are the two common defects of vision ?

....

....

(*b*) What is meant by the accommodation of the eye ? How is it brought about ?

....

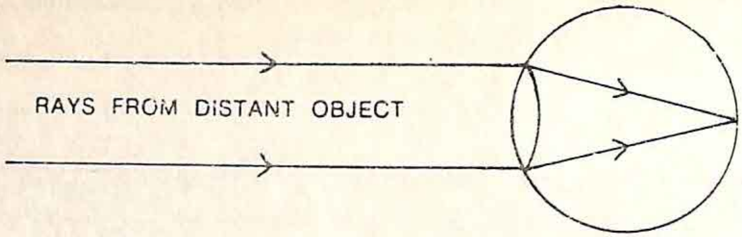
....

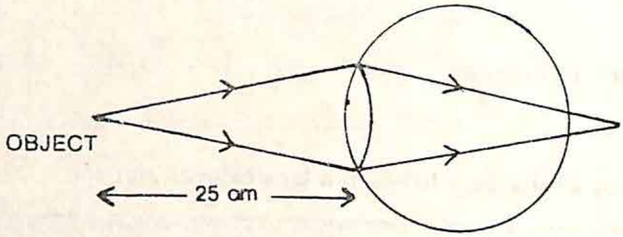
....

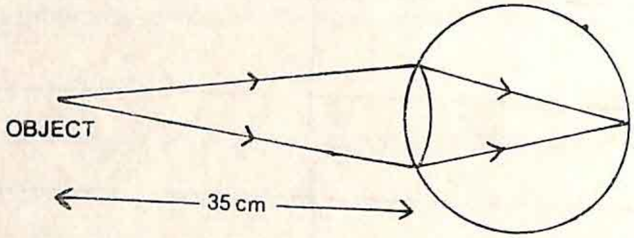
....

....

7. Study the diagrams :







(*a*) Name the defect in the vision.

(*b*) Give reason for the above defect.

(*c*) What is the remedy for this defect ?

(*d*) Draw a diagram to show the removal of the above defect.

(*e*) What is meant by persistence of vision of a man ?

☐ ☐

13

Dispersion of Light Through a Prism and Mixing of Colours

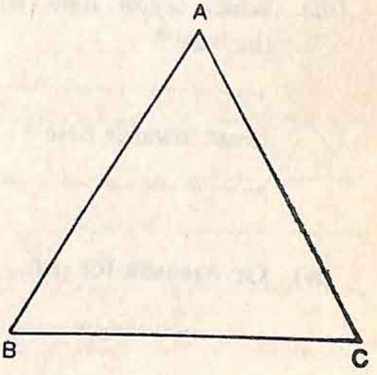
1. The diagram shows a triangular prism.

   Mark on the diagram—

   (*i*) Base on the Prism

   (*ii*) Angle of the Prism

   (*iii*) Refracting edges.



2.

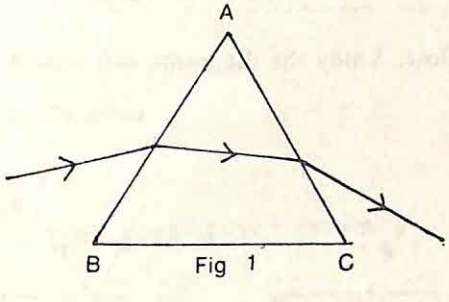


Fig 1

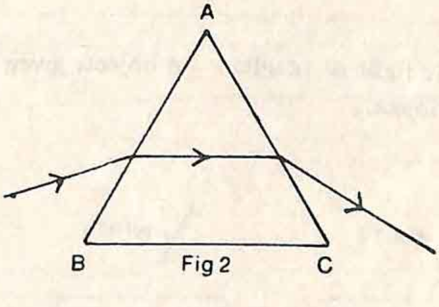


Fig 2

In the figures above a monochromatic light when passed is deviated as shown.

(*i*) **Mark on the figures the angle of deviation.**

(*ii*) **For which figure the angle of deviation is**

Maximum ....

Minimum ....

(*iii*) What is the condition for a minimum deviation ?

....

....

(*iv*) Locate the position of images for the figure on the previous page.

(*v*) What is the nature of image formed ?

....

3. (*i*) What do you expect on the screen ?

....

(*ii*) Give reason for (*i*).

....

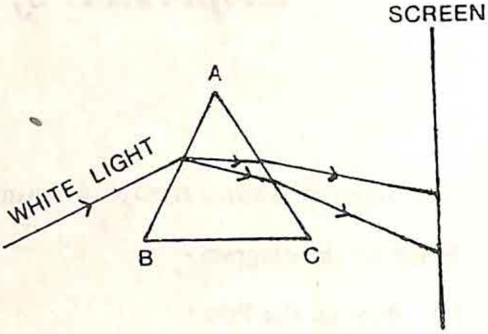
....

(*iii*) Which ray of light bends more towards the base ?

....

Least towards base ?

....



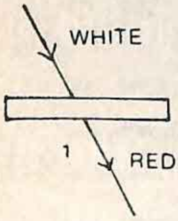
(*iv*) Give reason for (*iii*).

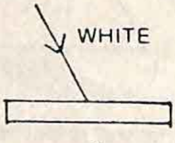
....

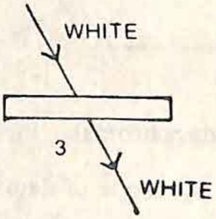
....

....

4. White light is incident on objects given below. Study the diagrams and conclude about the object.







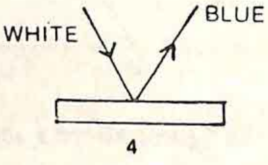


Fig. 1 ....

Fig. 2 ....

Fig. 3 ....

Fig. 4 ....

5. Describe with a neat diagram, how you would arrange to project a pure spectrum of white light on a screen.

Diagram :

Explanation :

6. (*a*) Explain the terms :

(*i*) Primary colour :

(*ii*) Secondary colour :

(*iii*) Complementary colour :

(*iv*) Pigment :

(*b*) (*i*) What are additive primaries ?

(*ii*) What are subtractive primaries.

(*iii*) What is the result of mixing the following colours of the spectrum ?

Red + Green.

Red + Blue.

....

Blue + Violet.

....

(*c*) Draw the colour triangle for the additive primaries.

7. (*a*) Explain the following. :

(*i*) Sky appears blue during day time.

....

....

(*ii*) A leaf appears green in sunlight.

....

....

(*b*) Name the invisible radiation given by—

(*i*) red hot iron. ....

(*ii*) arc formed during welding. ....

(*c*) Give one use of each of the radiations mentioned in (*b*).

....

....

☐ ☐

14

Wave Motion

1. (*a*) What is a wave ?

....

....

(*b*) Define :

(*i*) Mechanical wave.

....

....

One Example :

....

(*ii*) Electromagnetic wave.

....

....

One Example :

....

(*iii*) Transverse wave.

....

....

One Example :

....

(*iv*) Longitudinal wave.

....

....

One Example :

....

(*c*) What do you mean by the terms :

(*i*) Pulse.

....

....

(*ii*) A wave train.

....

....

(*iii*) Periodic wave.

....

....

One Example :

....

(*iv*) Non-Periodic wave

....

....

One Example :

....

2. (*a*) Define the following terms which are used to describe a Periodic wave :

(*i*) Wave length.

....

(*ii*) Frequency.

....

(*iii*) Wave velocity.

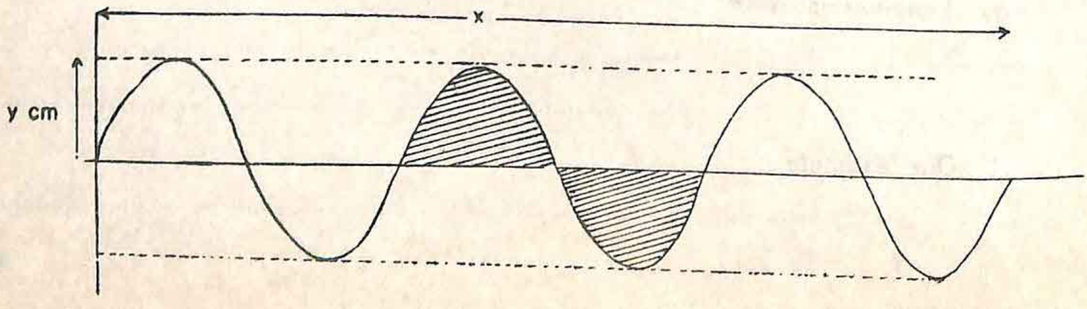
....

(*b*) Establish a relation among the above mentioned terms.

....

....

3. The diagram shows a transverse wave produced in a string. Four waves are generated in one second.



(*i*) What is the amplitude ?

....

(*ii*) What is the frequency ?

....

(*iii*) What is the wave length in terms of '*x*' ?

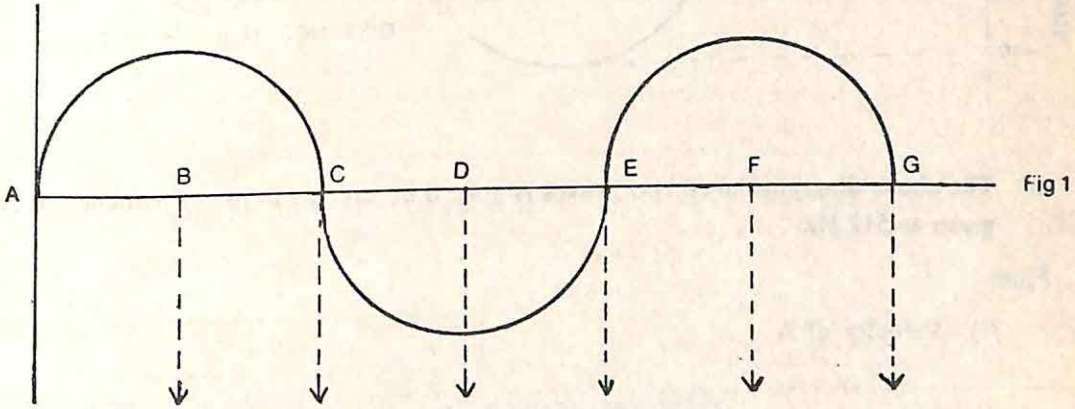
....

(*iv*) What is the velocity of the wave in terms of '*x*' ?

....

(*v*) For the shaded wave mark crest and trough.

4. (*a*)



The diagrams represent a transverse wave. For which of the points. A, B, C, D, E, F and G are the points of compression and rarefactions for a longitudinal wave ?

Mark under arrow the points of compression by **C** and point of rarefaction by **R.**

(*i*) What is the direction of

(A) Displacement of medium particles Fig. 1....................

Fig. 2....................

(B) Propagation of the wave Fig. 1....................

Fig. 2....................

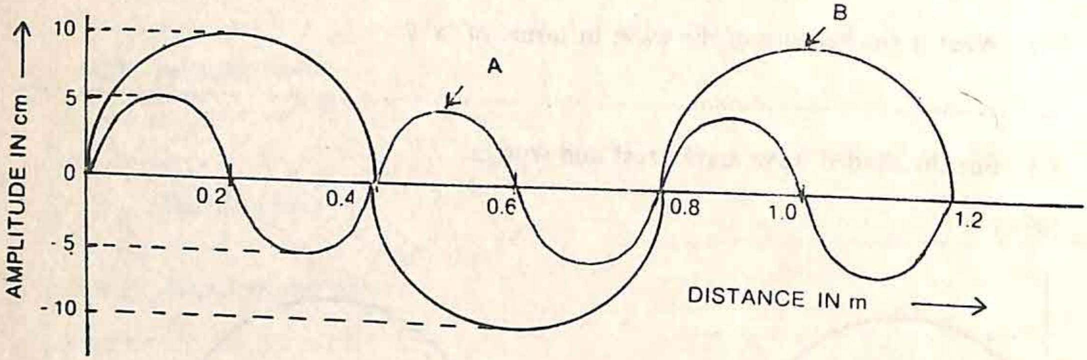
(*b*) Name the type of wave produced when—

(*i*) A tuning fork vibrates in air.

....

(*ii*) A stone is thrown in a pond.

(*iii*) A rope fixed at one end is given jerk from the second end.



5. (*a*) The above diagram shows two waves A and B in air medium. Frequency of A is given as 512 Hz.

Find

(*i*) Velocity of A

(*ii*) Velocity of B.

(*iii*) Frequency of B.

(*b*) Explain the following :

(*i*) A flash of lightening reaches first than the sound of a thunder.

(*ii*) The loudness of the emitted sound by a plucked wire can be increased if the wire is mounted on the board.

....

....

(*iii*) An iron railing is tapped some distance away. On keeping ear close to it, sound is heard twice.

....

....

(*a*) Define :

(*i*) Free vibration.

....

....

(*ii*) Forced vibration.

....

....

(*b*) What is the essential condition for resonance to occur ?

....

....

....

(*c*) Give one example to show that two objects oscillate in the same phase.

....

....

(*d*) Give four examples of Resonance.

1. ....

....

2. ....

....

3. ....

....

4. ....

....

7. (*a*) ————Frequency————→

Short Electrical wave	A	B	C	D	E	F	G	Cosmic Rays

(Not to scale)

The above diagram represents electromagnetic spectrum extending from short electrical wave to cosmic Ray. The letters A, B, C, D, E, F and G represent different types of radiations.

Name the radiation used

(*i*) In television transmission

....

(*ii*) In radio waves.

....

(*b*) Name the radiation—

(*i*) Which damages retina.

....

(*ii*) Which enables us to see.

....

(*iii*) Which helps in relieving pain on joints.

....

(*iv*) Which helps in developing a photograph.

....

(*v*) Which is used to sterilize surgical instruments.

....

(*vi*) Which is of nuclear origin.

....

(*vii*) Which are called as X-rays.

....

(*viii*) Which radiation has least wavelength ?

....

ANSWERS

5. (*a*) (*i*) 204·8 m/s (*ii*) 204·8 m/s (*iii*) 256 Hz.

15

Vibrations and Musical Notes

1. (*a*) What is the range of audio frequencies ?

....

(*b*) The science which undertakes the study of sound is called as ....

(*c*) How is the velocity of sound effected if

(*i*) Air is replaced by carbon dioxide.

....

....

(*ii*) Air pressure is doubled.

....

(*iii*) Temperature of a place increases.

....

....

(*iv*) Humidity increases.

....

(*d*) Velocity of sound at 0°C is 332 m/s. Calculate the velocity of sound at 30°C.

....

....

(*e*) Name the range of sound vibration generated by

(*i*) Mosquitoes ....

(*ii*) Bats ....

(*iii*) Jets ....

(*iv*) Dolphins ....

2. (*a*) What is the relation between pitch and frequency of vibration ?

(*b*) How is the frequency of vibration of a stretched string dependent on

(*i*) Length of the wire.

(*ii*) Tension in the wire.

(*iii*) Mass of the wire.

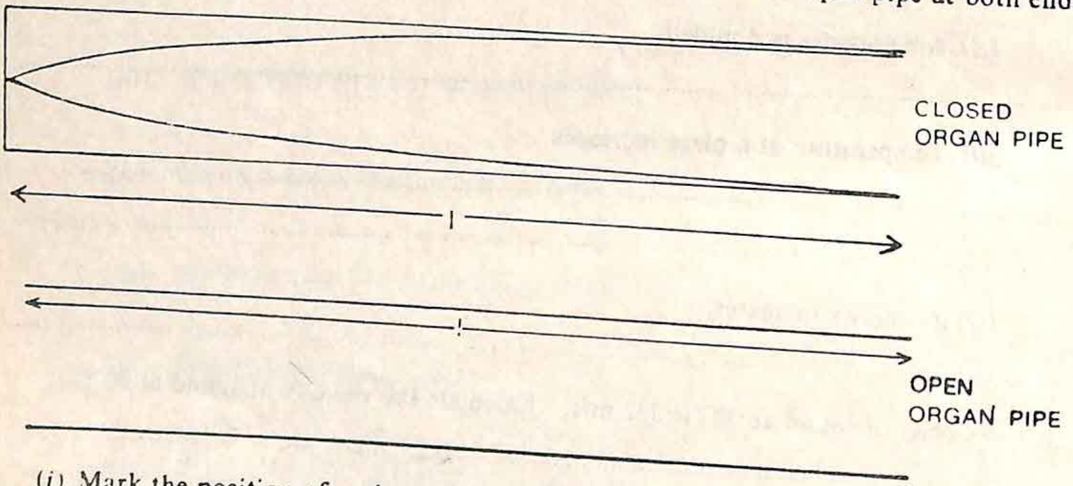
(*c*) With the help of a diagram show the production of

(*i*) the fundamental harmonic in a stretched string.

(*ii*) the second harmonic in a stretched string.

(*iii*) the third harmonic in a stretched string.

3. The diagram below shows a pipe closed at one end in its fundamental mode of vibration. Draw the fundamental mode of vibration of air column for the open pipe at both ends.



(*i*) Mark the position of nodes and antinodes for the above diagram.

(*ii*) Work out ratio of the wavelengths.

(*iii*) Work out ratio of the frequencies.

Give one example of

(*iv*) open organ pipe.

....

(*v*) closed organ pipe.

....

4. (*a*) What is an echo ?

....

....

(*b*) What is the difference between echoes and reverberations ?

....

....

(*c*) What is the minimum distance required between sound source and reflecting surface for echo ?

....

(*d*) How is the speed of sound determined by an echo ?

....

....

(*e*) An observer standing between two cliffs shouts in a loud voice. He hears one echo after 1·5 s and the other after 4 s. If the velocity of sound in air be 330 m/s find—

(*i*) the distance of the observer from the first cliff.

....

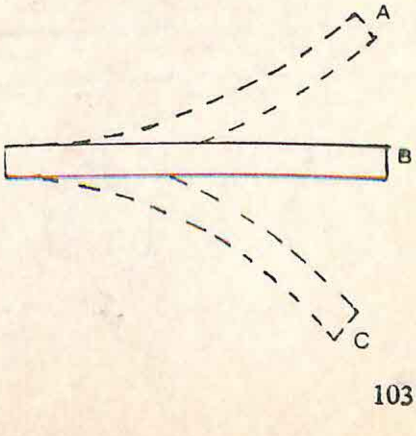
....

(*ii*) The distance between the two cliffs.

....

....

5. (*a*) The adjacent diagram shows three positions marked as A, B and C of one limb of a tuning fork in vibration.



(*i*) Show the amplitude of the vibrating fork by putting ↔ in the diagram.

(*ii*) Calculate the frequency of the sound wave produced if the limb moves from position B to C and back again to B in $\frac{1}{100}$ second.

....

....

(*iii*) Calculate the wavelength of the wave produced if the velocity of sound in air is 340 m/s.

....

....

(*b*) A man stands at a certain distance from a wall and sets up a simple pendulum which makes two vibrations per second. He claps his hands and hears the echo exactly after three complete oscillations of the pendulum. Calculate how far he is from the wall. Take the velocity of sound in air 340 m/s.

....

....

....

....

ANSWERS

1. (*d*) 350 m/s. 4. (*e*) (*i*) 247·5 m, (*ii*) 907·5 m. 5. (*a*) (*ii*) 50 (*iii*) 6·8 m. (*b*) 255 m.

□ □

16

Electrostatics

1. Explain the following :

(*i*) After moving a comb through hair it has capacity to attract small bits of paper.

....

....

(*ii*) When we take out silk shirt in dark, sparks are seen.

....

....

(*iii*) A celo tape has better adhesive power to stick on a glass plate which is rubbed with silk.

....

....

2. (*a*) Explain :

(*i*) An ebonite rod gets negatively charged when rubbed with fur.

....

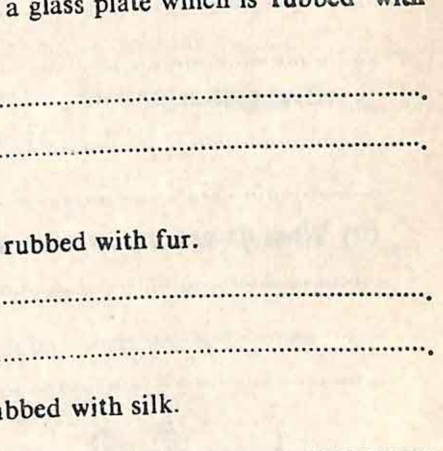
....

(*ii*) A glass road gets positively charged when rubbed with silk.

....

....

(*b*) The diagram shows a pair of metal spheres A and B suspended from a rigid support.



What is your observation ?

....

....

Give reason.

....

....

3. Fig. I shows a positively charged gold leaf electroscope with cap made up of photo surface.

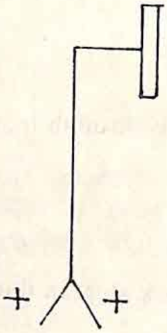


Fig 1

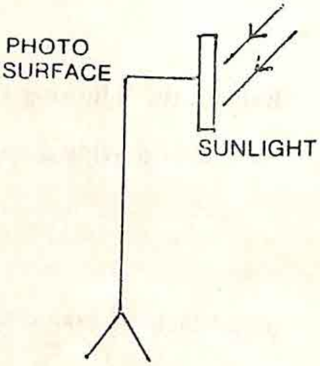


Fig II

(*i*) What do you expect when sunlight is focused on the cap as shown in Fig. II ?

....

....

Give reason.

....

....

....

(*ii*) What do you expect when sunlight is removed and the cap is touched by finger ?

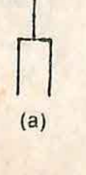
....

....

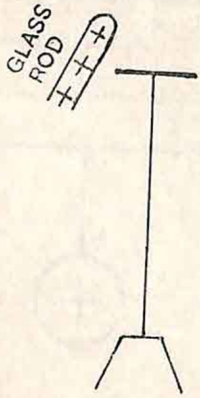
....

....

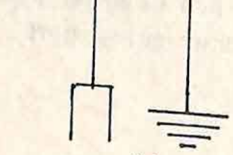
4.



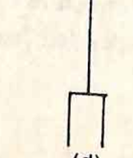
(a)



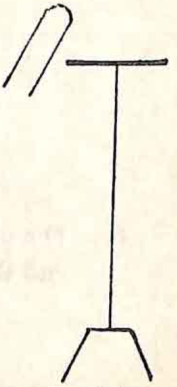
(b)



(c)



(d)



(e)

Various stages of charging of a gold leaf electroscope by induction are shown by **figures** (*a*), (*b*), (*c*). (*d*) and (*e*).

For Fig. (*b*)

What charge is developed on

(*i*) metal cap.

....

(*ii*) gold leaves.

....

For figure (*c*)

(*iii*) Why do gold leaves collapse.

....

....

For Fig. (*d*)

(*iv*) Leaves still remain collapsed. What charge developes on the **metal cap** ?

For Fig. (*e*)

....

(*v*) After removing the glass rod the electroscope is ultimately charged. **What charge** developes on

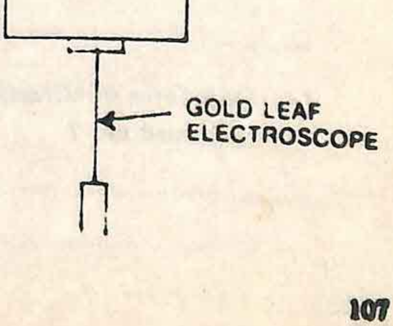
Metal Cap :

....

Gold leaves :

....

5. Put a copper container on a gold leaf electroscope as shown in the diagram.



(*i*) What happens to the gold leaves when a positively charged sphere suspended by silk thread is lowered in the container without touching the container ?

....

....

....

(*ii*) Label the charges on copper container and on gold leaf.

(*iii*) What is your observation when the sphere is taken out of the container.

....

Give reason.

....

....

(*iv*) What is your observation when the sphere is touched with the container ?

....

....

Give reason.

....

....

6. (*a*) State Coulomb's law of electrostatics.

....

....

....

(*b*) Two charges attract each other with a force of 2×10^{-6} N when they are 'X' *m* apart. When their separation is reduced by 0·4 m. the force between them is 4×10^{-6} N. What is their initial separation ?

....

....

....

(*c*) Does force of attraction or repulsion between two charges get affected by replacing their medium ?

....

....

(*d*) Calculate the number of electrons that make one coulomb of charge ?

....

....

(*e*) Of the electrostatics force and gravitational force, which is more strong ?

....

ANSWERS

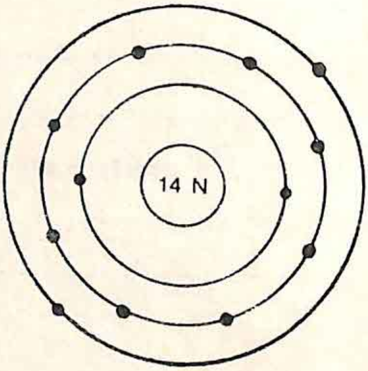
6. (*b*) 1·37 m. (*c*) $6{\cdot}25 \times 10^{18}$.

□ □

17

Conductors and Insulators

1. Aluminium atom has the given atomic structure.



(*i*) Count the number of electrons.

....

(*ii*) What should be the

Proton number : ....

Mass number : ....

(*iii*) How many valence electrons are in an aluminium atom ? ....

....

(*iv*) Why are there only two electrons in the inner-most shell ?

....

....

(*v*) What are bound electrons and free electrons ?

....

....

(*vi*) In which group of periodic table does aluminium element lie ?

....

....

(*vii*) Justify the classification done in (*vi*).

....

....

2. (*a*) Explain the difference between conductors and insulator of electricity on the basis of electron movement.

....

....

....

....

(*b*) Give two examples of—

Insulators :

....

....

Conductors :

....

....

(*c*) Is there any other class between insulators and conductors ?

....

(*d*) Give two examples.

....

....

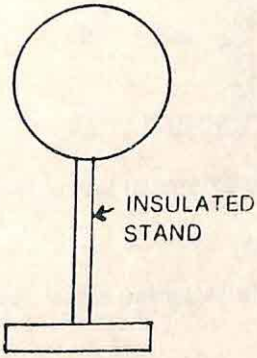
In which group of periodic table does this class lie ?

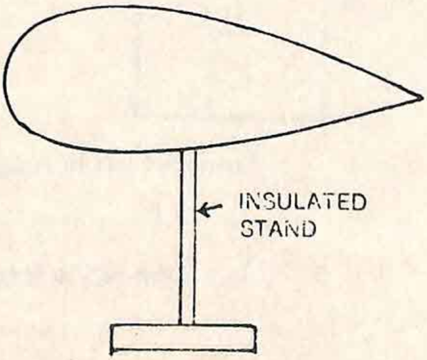
....

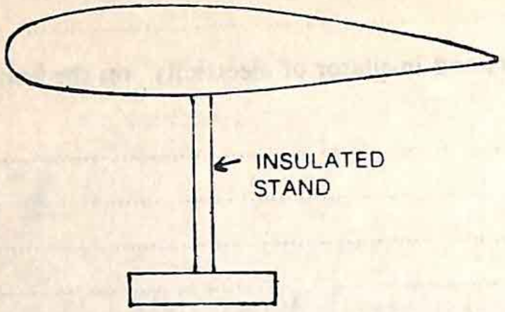
How does the resistance vary with increase of temperature of the class mentioned in (C) ?

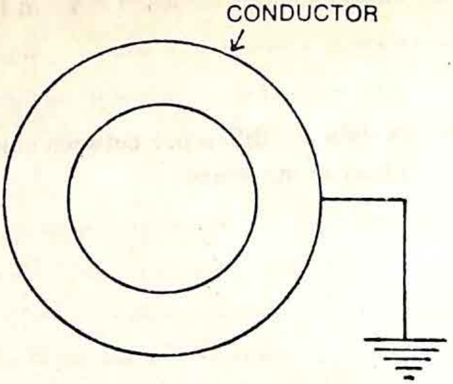
....

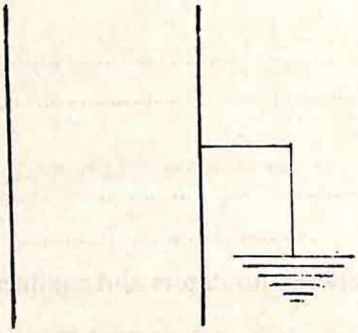
3. Show the positive charge distribution on the following conductors.











4. (*a*) What would happen if a positively charged sphere is brought

(*i*) inside a metal can ....

....

(*ii*) in contact with a large uncharged conducting sphere ....

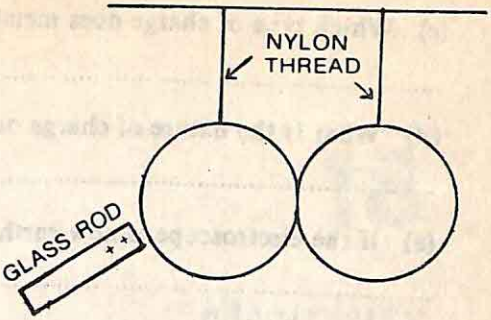
....

....

(*b*) Draw diagrams to show the stages in charging of an electroscope positively by induction.

☐ ☐

(*c*) A positively charged glass rod is held near two conducting spheres **A** and **B** which touch each other and are suspended by nylon threads.



(*i*) What is the nature of charge obtained by

Sphere A : ....

....

Sphere B : ....

....

(*ii*) What happens to the charges on A and B when the glass rod is removed after separating the spheres ?

....

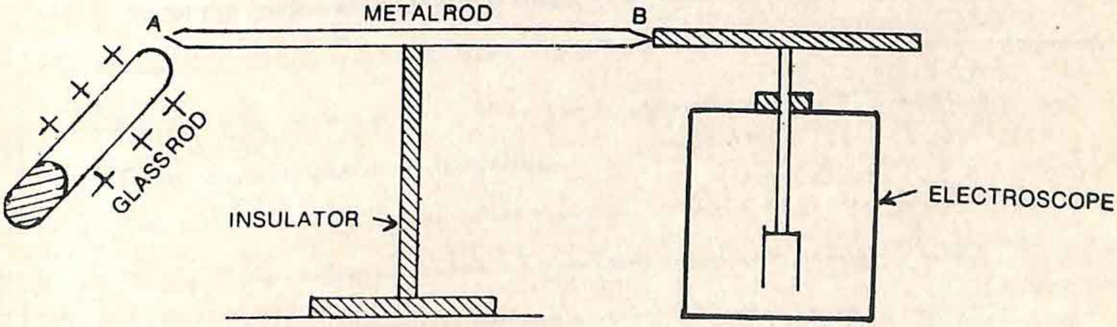
....

....

(*iii*) Why are nylon threads used ?

....

5. Study the diagram and answer the following questions :



(*a*) What is the nature of charge at end A of the metal rod ?

....

(*b*) What is the nature of charge at end B of the metal rod ?

....

(*c*) **Which type of charge does metal disc of the electroscope possess ?**

....

(*d*) **What is the nature of charge on gold leaves ?**

....

(*e*) **If the electroscope is now earthed, what charge will the metal rod have ?**

....

....

6. (*a*) **What is a lightening conductor ?**

....

....

(*b*) **Why has it a sharp tip ?**

....

....

(*c*) **Why is it earthed ?**

....

....

☐ ☐

18

Electricity

1. (*a*) **Name the three effects produced by an electric current.**

....

....

....

(*b*) **What is an electrolyte ?**

....

....

....

(*c*) **Give two examples of electrolytes.**

....

....

(*d*) **Name the device which helps in studying electrolysis.**

....

....

2. (*a*) **Define Faraday's laws of electrolysis.**

....

....

....

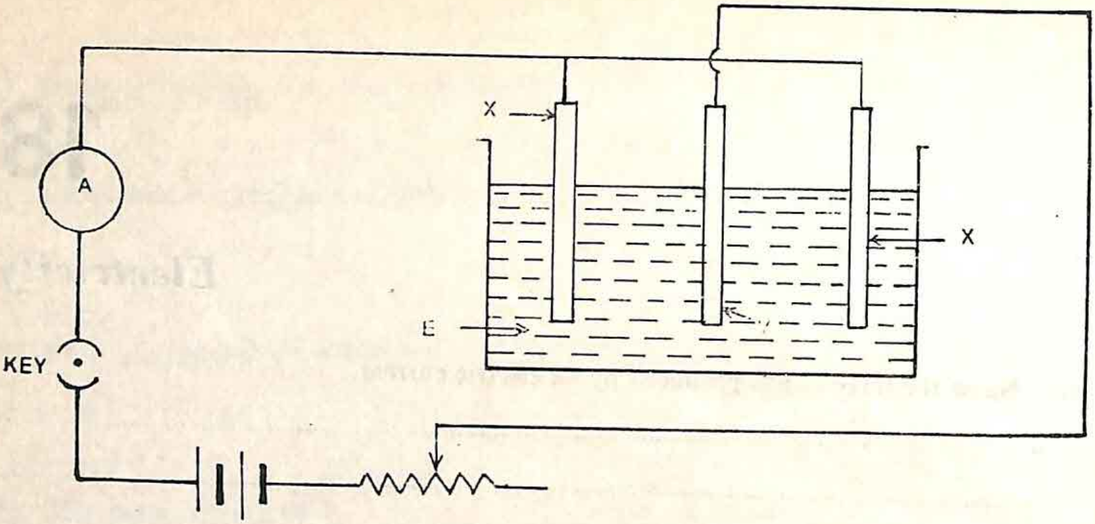
....

....

(*b*) **What do you mean by the statement : "The e.c.e. of silver is $1{\cdot}118 \times 10^{-6}$ kg/C" ?**

....

(*c*)



An object Y is to be electroplated with copper. The above circuit shows such arrangement,

(*i*) What should be

E. ....

X. ....

Y. ....

(*ii*) Mark the polarities of X and Y plates.

(*iii*) Why is 'Y' plate surrounded by two 'X' plates ?

....

....

(*iv*) Why is it adviced to pass small but constant current for a longer duration ?

....

....

(*v*) Name the ion which moves towards

X. ....

Y. ....

(*vi*) What is the role of rheostat in the circuit ?

....

....

3. (*a*) What is an irreversible cell ?

....

....

(*b*) Name three irreversible cells ?

....

....

....

(*c*) What is a reversible cell ?

....

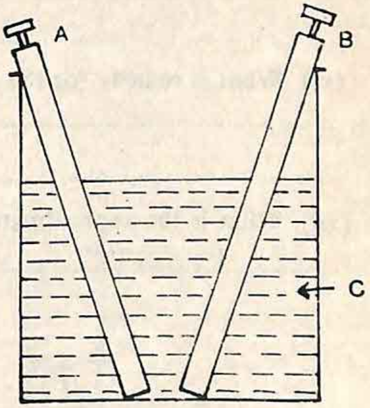
....

(*d*) Name two reversible cells

....

....

4. The figure shows a simple cell.



(*i*) Name the parts :

A. ....

B. ....

C. ....

(*ii*) Why do we take A and B of disimilar metals ?

....

....

(*iii*) If we say A has positive polarity when connected with external circuit, then name the metal A.

....

(*iv*) Which ion moves towards

A. ....

B. ....

(*v*) When cell is in use an invisible gas comes out. Name that gas.

....

(*vi*) Complete a circuit by connecting a torch bulb. Mark the conventional current direction.

(*vii*) The glow of bulb diminishes when the cell is continuously used for a long time. Why ?

....

....

(*viii*) Some defect has occurred in (*vii*), name that defect. What is the remedy for such defect ?

....

....

....

(*ix*) What is a disadvantage of the defect discussed in (*viii*) ?

....

....

(*x*) The use of impure electrode 'B' gives another defect. Name the defect.

....

(*xi*) What is remedy for the defect mentioned in (*x*).

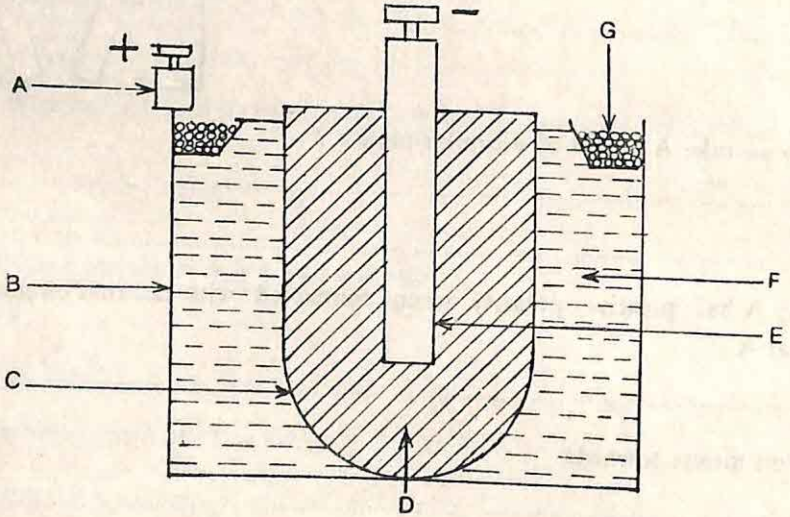
....

....

(*xii*) What is the approximate e.m.f. generated by a simple cell ?

....

5.



The figure above shows a **Daniel Cell.**

(*i*) Name the parts :

A. ....

B. ....

C. ....

D. ....

E. ....

F. ....

G. ....

(*ii*) State the function of each part.

....

....

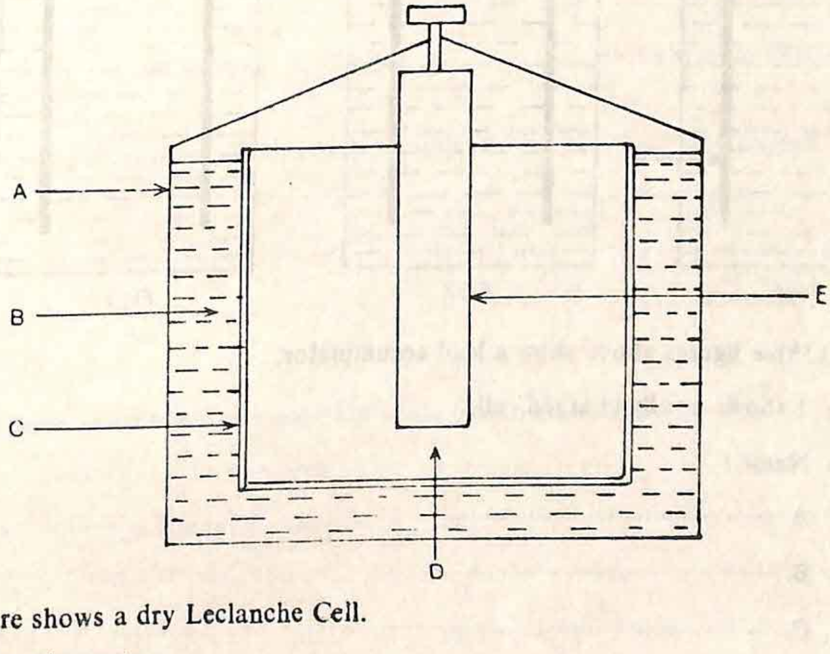
....

....

(*iii*) What is the approximate e.m.f. generated by this cell ?

....

6.



The figure shows a dry Leclanche Cell.

(*a*) Name the parts :

A. ....

B. ....

C. ....

D. ....

E. ....

(*b*) State the function of each part.

....

....

....

(*c*) These type of cells leak when used continuously. Why ?

....

....

(*d*) What is the approximate e.m.f. generated by this cell ?

....

7.

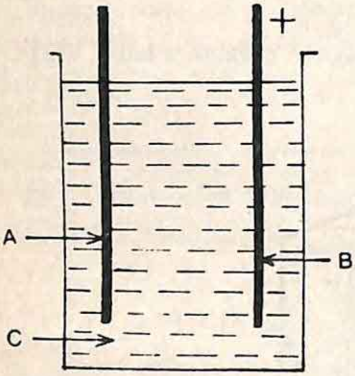


Fig 1

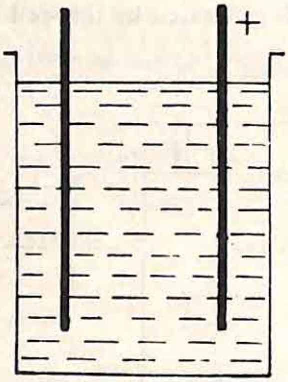


Fig 2

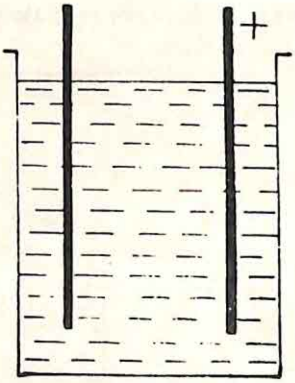
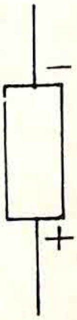


Fig 3



CHARGER

The first three figures above show a lead accumulator.

(*a*) Fig. 1 shows a fully charged cell.

(*i*) Name :

A. ....

B. ....

C. ....

(*ii*) What is the colour of

A. ....

....

(*iii*) What is the density of C ?

....

(*iv*) What is the e.m.f. ?

....

(*b*) Fig. 2 shows a fully discharged cell.

(*i*) Name :

A. ....

B. ....

(*ii*) What is the colour of

A. ....

B. ....

(*iii*) What is the density of C ?

....

(*iv*) What is the e.m.f ?

....

(*c*) Fig. 3 is to arrange with charger so that the cell is charged. Give the proper connections.

(*d*) Write the precautions which one must take in order to maintain this cell.

....

....

....

....

(*e*) Give three advantages of a secondary cell over a primary cell.

....

....

....

....

☐ ☐

19

Ohm's Law and Circuit Theory

1. (*a*) State Ohm's law.

....

....

(*b*) Define the unit of Resistance.

....

....

(*c*) Name three ohmic conductors.

....

....

....

(*d*) Name three non-ohmic conductors.

....

....

....

(*e*) Name a conductor whose resistance increases with increase of temperature.

....

(*f*) Name a conductor whose resistance decreases with increase of temperature.

....

(*g*) What do you mean by internal resistance of a cell ?

....

....

(*h*) "The terminal potential difference between the poles of a cell is always less than the e.m.f. of the cell." Why ?

……………………………………………………………………………………

……………………………………………………………………………………

2. (*a*) Draw a circuit diagram and explain how you can verify **Ohm's law.**

Explanation : ……………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

(*b*) In order to draw heavy current from a number of cells, what **combination you will** try if

(*i*) External resistance is low in comparison to the **internal resistance.**

……………………………………………………………………………………

……………………………………………………………………………………

Explanation : ……………………………………………………………………

……………………………………………………………………………………

(*ii*) External resistance is high in comparison to **the internal resistance.**

……………………………………………………………………………………

……………………………………………………………………………………

Explanation : ……………………………………………………………………

……………………………………………………………………………………

(*c*) When resistances are connected in series then voltage/**current distributes.**

……………………………………………………………………………………

(*d*) When resistances are connected in parallel then **voltage/current/resistance distributes.**

……………………………………………………………………………………

3. (*a*) Define specific resistance of a conductor.

……………………………………………………………………………………

……………………………………………………………………………………

(*b*) List the factors on which the specific resistance of a conductor depends.

....

....

....

(*c*) Give reason :

(*i*) Street light connecting wires are made thick.

....

....

(*ii*) Fuse wires are thin aluminium wires.

....

....

(*iii*) Electric lamp filament are made very thin.

....

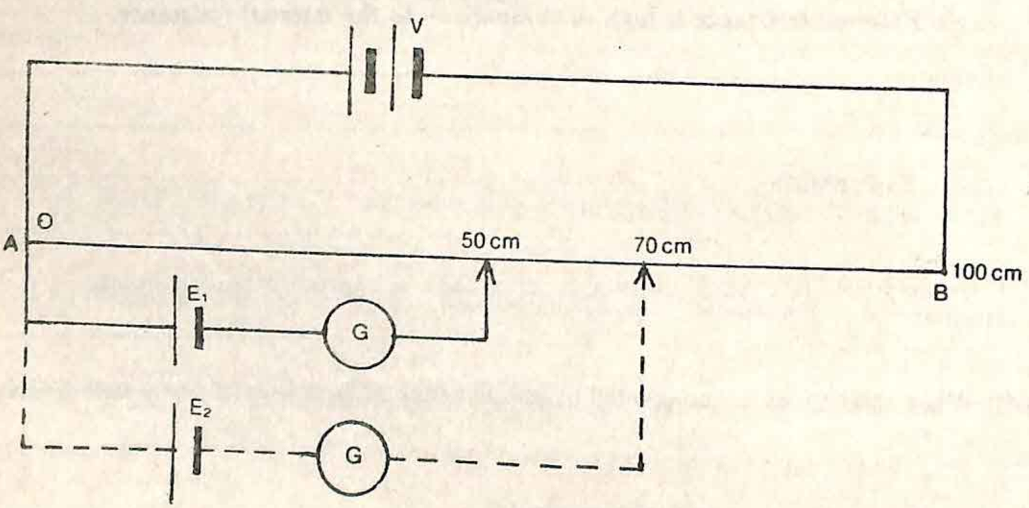
....

(*d*) A one metre copper wire of radius 1 mm is stretched to 4 m length so that radius becomes 0·5 mm. What is the new resistance ?

....

....

(*e*)



In the above circuit when cell E_1 is put then galvanometer shows deflection at 50 cm. Now E_1 is replaced by E_2 which gives zero at 70 cm. Compare the e.m.f. of the two cells.

....

....

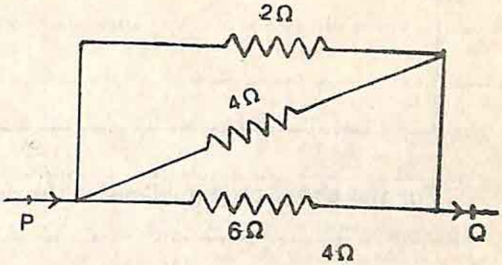
4. Calculate the equivalent resistance between the points P and Q in each of the following figures :

(*i*) ....

....

....

....

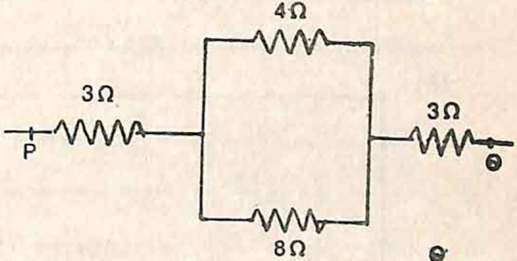


(*ii*) ....

....

....

....

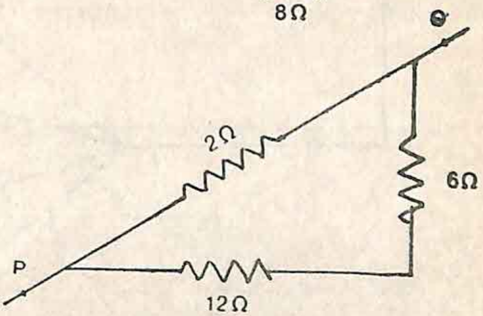


(*iii*) ....

....

....

....

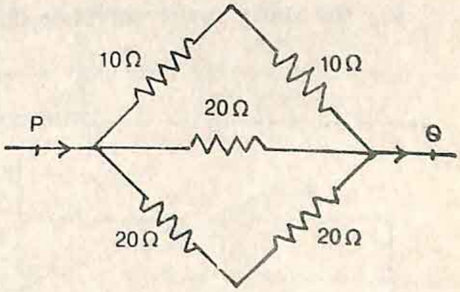


(*iv*) ....

....

....

....

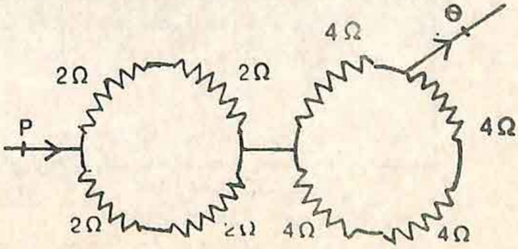


(*v*) ....

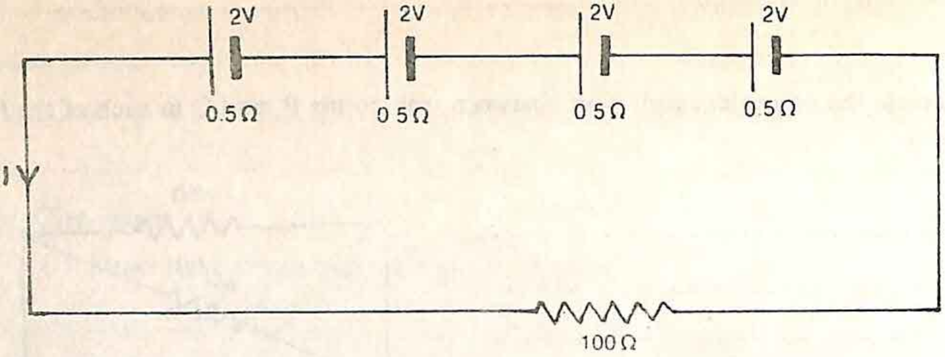
....

....

....



5. (*a*)

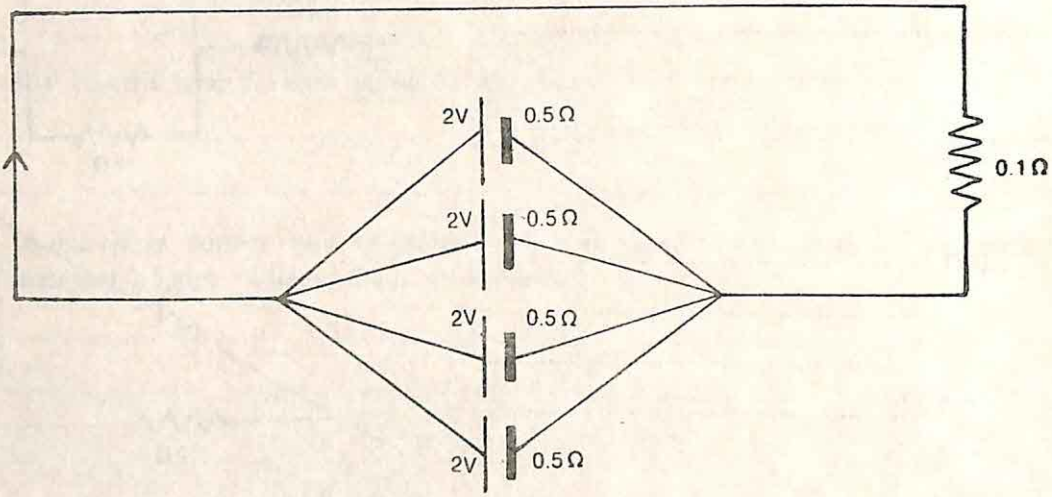


For the above circuit calculate the current I.

....

....

(*b*)

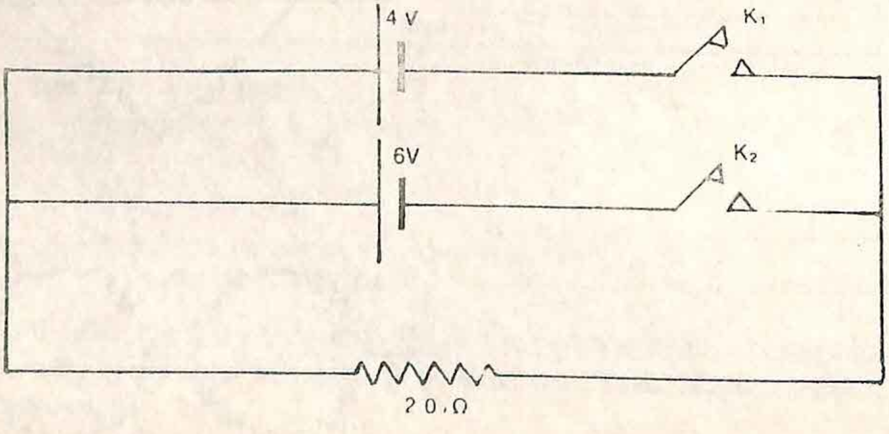


For the above circuit calculate the current I.

....

....

(*c*)



Calculate current in the circuit when

(*i*) K_1 is closed :

....

....

....

(*ii*) K_2 is closed :

....

....

....

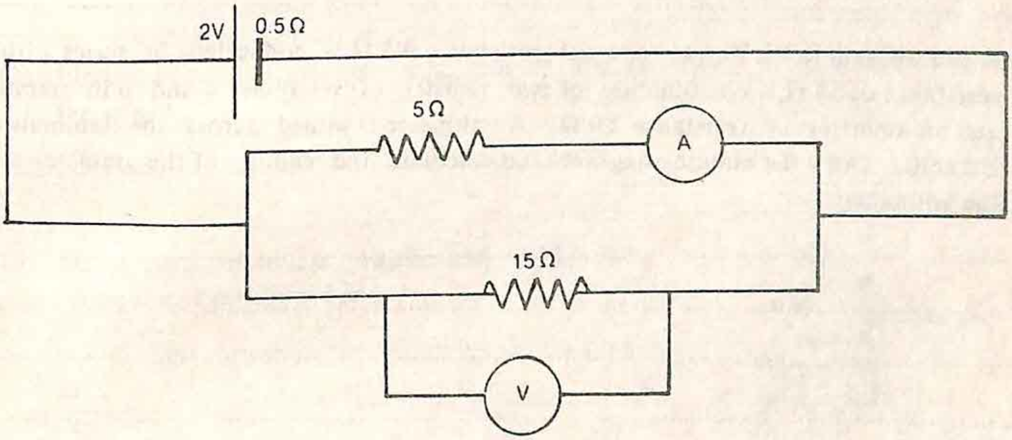
(*iii*) K_1 and K_2 are closed :

....

....

....

6. (*a*)



In the above circuit what is the reading in

(*i*) Ammeter :

....

....

....

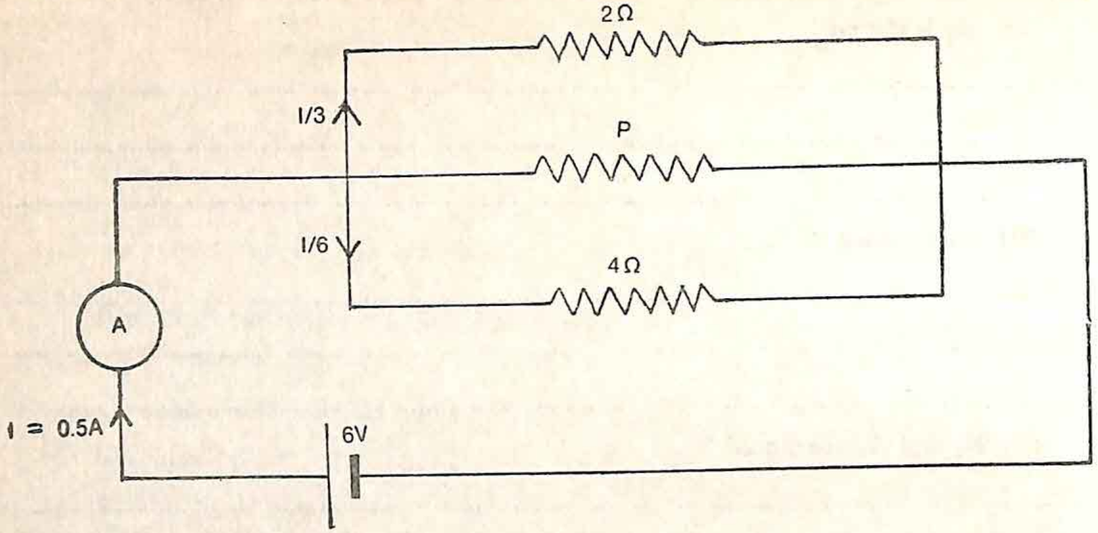
(*ii*) Voltmeter :

....

....

....

(*b*)



Calculate the value of resistance P.

....

....

(*c*) A cell of e.m.f. 1·5 V and internal resistance 0·5 Ω is connected in series with a resistance of 10 Ω, a combination of two register of resistance 4 and 6 in parallel and an ammeter of resistance 2·0 Ω. A voltmeter is joined across the terminals of the cells. Draw the circuit diagram and calculate the reading of the ammeter and the voltmeter.

....

....

....

....

....

ANSWERS

3. (*d*) 8 times of original, (*e*) $E_1 : E_2 = 5 : 7$ **4.** (*i*) 12/11 Ω, (*ii*) $8\frac{2}{3}$ Ω, (*iii*) 1 8 Ω, (*iv*) 8 Ω, (*v*) 5 Ω **5.** (*a*) 0·08 A, (*b*) 0·247 A, (*c*) (*i*) 0·2 A, (*ii*) 0·3 A, (*iii*) 0·5 A, **6.** (*a*) (*i*) 6/17 A (*ii*) 1·77 V, (*b*) 24 Ω, (*c*) (*i*) 0·10 A, (*ii*) 1·45 V.

□ □

20

Applications of Electric Heating

1. (*a*) State the factors on which the heat developed in a conductor depends.

....

....

....

(*b*) Two wires are of same length and material but the thickness of one is twice the other. They are heated with the same current for the same time. Calculate the ratio of heats developed.

....

....

2. (*a*) Electric heating appliances make use of special wire. What is the requirement of the wire ?

....

....

(*b*) Name two materials which can fulfill the requirement mentioned in (*a*)

....

....

3. The diagram shows a electric lamp.

(*a*) Name the parts :

A. ....

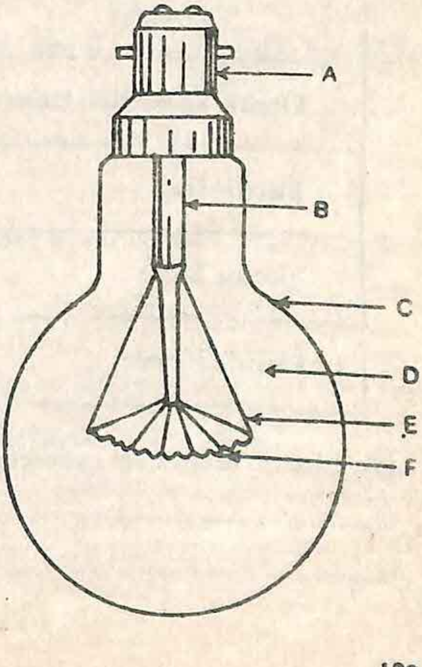
B. ....

C. ....

D. ....

E. ....

F. ....



(*b*) What is the role of gases D ?

....

....

(*c*) Why do we choose material of E different from material of F ?

....

(*d*) An electric bulb is labelled 250 V, 100 W.

Calculate :

(*i*) Current through filament.

....

....

(*ii*) Heat generated per second.

....

....

(*iii*) How long would this lamp take to consume two units of electric energy when connected to 250 V mains ?

....

....

4. (*a*) Complete the table :

Appliance	*Material of the wire*	*Insulator*
Electric Immersion Heater		
Electric Iron		
Electric Stove		
Electric Heater		

(*b*) Electric heaters are connected with reflectors. Why ?

....

....

(*c*) The outlet pipes of a geyser chokes after long use. Why ?

....

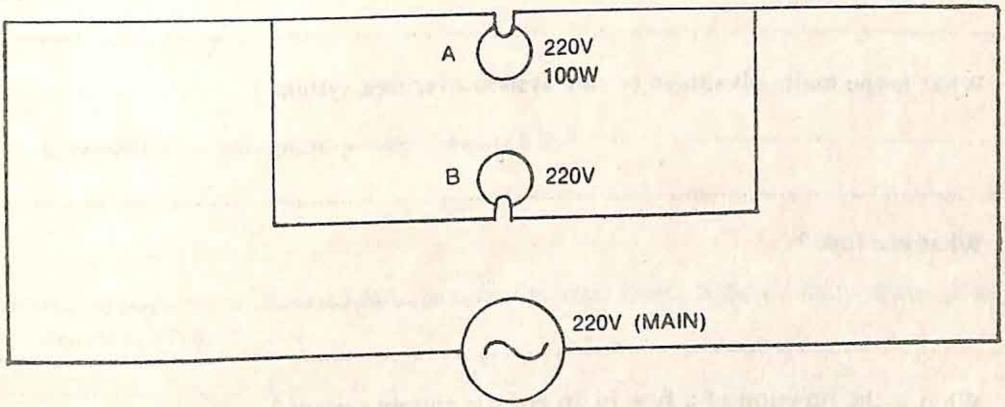
....

5. (*a*) An electric iron is rated at 750 W, 220 V. Calculate the energy consumed in 10 hours.

....

....

(*b*)



In the above circuit two lamps A and B are connected to 220 V mains. The lamp A draws a current of 2A. After a certain time lamp B fuses and now through lamp A, 5A of current flows. What is the wattage of lamp B ?

....

....

(*c*) Two bulbs are rated 40 W, 250 V, and 100 W, 250 V. Which bulb has higher resistance ?

....

....

6. (*a*) An electrical supply cable consists of three coloured wires. What is the function of each wire ?

....

....

(*b*) What convention is adopted to have the three different colours of wires ?

....

....

....

(*c*) What is a tree system circuit ?

....

....

(*d*) What is a ring system circuit ?

....

....

(*e*) What is the main advantage of ring system over tree system ?

....

....

7. (*a*) What is a fuse ?

....

....

(*b*) What is the function of a fuse in an electric supply system ?

....

....

(*c*) Explain the following :

(*i*) Fuse is put in the live wire.

....

....

(*ii*) Switches are connected in the live wire.

....

....

(*iii*) There is spark in the switch at make or break of the circuit.

....

....

(*iv*) Electrical appliances are earthed.

....

....

(*v*) Each flexible lead has a number of fine wires.

....

....

(*vi*) Ladies handling electrical appliances are advised to stand on wood.

....

....

8. (*a*) What is an electric shock ?

....

....

(*b*) How will you safe guard yourself against it ?

....

....

(*c*) If current more than 15 mA passes through your body it may cause breathing problem. Why ?

....

....

(*d*) Often bats are seen hanging dead on the street wires. Why ?

....

....

ANSWERS

1. (*b*) $H_1 : H_2 :: 1 : 4$. 3. (*I*) (*i*) 0·4 A, (*ii*) 100 J, (*iii*) $7{\cdot}2 \times 10^4$ J. 5. (*a*) $2{\cdot}7 \times 10^7$ J, (*b*) 660 W, (*c*) 40 W bulb has higher resistance.

□ □

21

Energy

1. (*a*) For each of the following, state the energy changes :

(*i*) A match stick when rubbed on a rough surface ignites.

....

....

(*ii*) Petrol burns to drive a motor car.

....

....

(*iii*) A bullet fired heats the barrel as well as the target.

....

....

(*iv*) Brakes of a moving car get heated up when applied for an appreciable time.

....

....

(*b*) Give one example of the following transformations of energy :

(*i*) Electric to heat and then to light.

Example : ....

(*ii*) Electrical to chemical.

Example : ....

(*iii*) Light to electrical.

Example : ....

(*iv*) Mechanical to heat.

Example : ....

(*v*) Mechanical to electrical.

Example : ....

(*vi*) Potential to kinetic and then to heat.

Example : ....

(*vii*) Chemical to heat and then to kinetic.

Example : ....

(*c*) State the law of conservation of energy.

....

....

2. (*a*) Define the terms :

Melting :

....

....

Boiling :

....

....

(*b*) **What is the effect of pressure change on :**

Melting point : ....

....

Boiling point : ....

....

(*c*) What is the effect of pressure of impurities on :

Melting point : ....

Boiling point : ....

....

(*d*) What is evaporation ?

....

....

(*e*) **State the factors by which the rate of evaporation can be changed.**

....

....

....

....

3. (*a*) Define Potential Energy.

....

....

(*b*) The bodies of masses m and $2m$ are kept at the same height. What is the ratio between their potential energies ?

....

....

(*c*) Two bodies of equal masses are kept at a height of h and $4h$. What is the ratio between their potential energies ?

....

....

(*d*) A body of mass $3m$ is kept at a height 'h'. At what height shold the body of mass 'm' be kept in order to have same potential energy as that of body of mass '$3m$' ?

....

....

4. (*a*) Define Kinetic Energy.

....

....

(*b*) A scooter of mass 100 kg and a moped of mass 30 kg move with the same speed. Compare their kinetic energies.

....

....

(*c*) Two bodies of masses, m and $2m$ possess equal kinetic energy. Compare their velocities.

....

....

(*d*) Two bodies of equal masses are moving with uniform velocities v and $2v$ respectively, find the ratio of their kinetic energies.

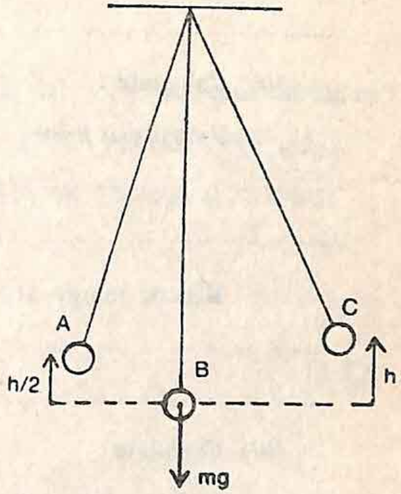
....

....

(*e*) A light and a heavy mass possess equal kinetic energies. Compare their momentum ?
Take $m_1=4m_1$.

....

....



5 (*a*) The diagram shows three positions A, B and C of a pendulum bob in motion.

(*i*) Calculate potential energy of the bob at position

A. ....

C. ....

(*ii*) What is the ratio of potential energy at A to that at C.

....

....

(*iii*) Calculate velocity in terms of 'h' at position

A. ....

B. ....

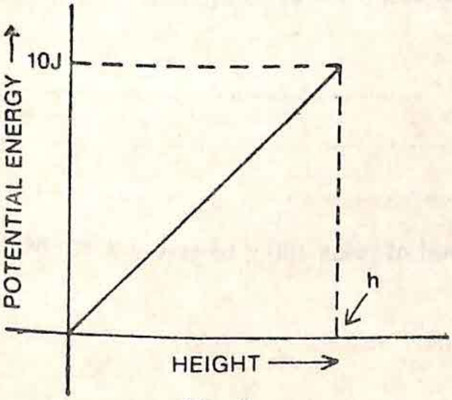


Fig 1

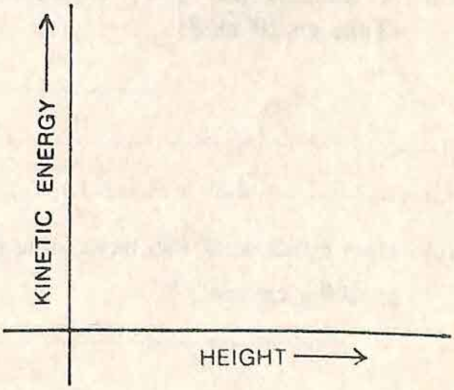


Fig 2

(*b*) A body of mass 200 g is thrown vertically upward Fig. 1 shows relation between the height to which the body is raised and corresponding potential energy possessed. From the information of Fig. 1 draw the graph of Fig. 2.

(*i*) Calculate height '*h*' :

....

....

(*ii*) Calculate :

Velocity at $h=0$:

....

....

Kinetic energy at $h=0$:

....

....

(*iii*) Calculate :

Height when body possesses 8 J of potential energy.

....

....

Kinetic energy when body possesses 8 J of potential energy.

....

....

....

6. (*a*) A machine has power of 1·5 kW. How far can it lift a 30 kg mass in 3 seconds. (Take $g=10$ m/s^2)

....

....

....

(*b*) How much work will have to be done on a ball of mass 100 g to give it a momentum of 200 g cm sec^{-1} ?

....

....

....

(*c*) A bulb is labelled 100 W, 250 V. How much energy does it consume in 12 seconds ?

……

……

……

ANSWERS

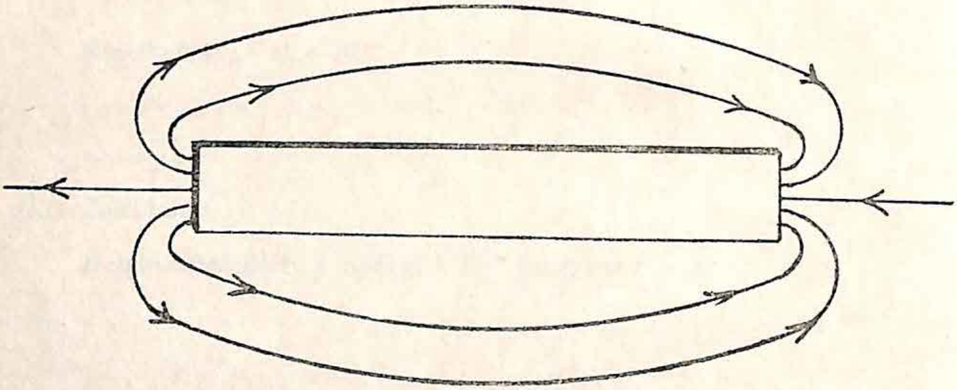
3. (*b*) 1 : 2 (*c*) 1 : 4 (*d*) $3h$ 4. (*b*) 10 : 3 (*c*) $\sqrt{2} : 1$ (*d*) 1 : 4 (*c*) **momentum of heavy is twice that of light** 5. (*a*) (*i*) $\frac{mgh}{2}$, mgh (*ii*) A : C : : 1 : 2 (*iii*) $\sqrt{gh}, \sqrt{2gh}$ (*b*) (*i*) 5·1 *m* (*ii*) 10 *m/s*, 10 J (*iii*) 4·08 *m*, 2 J 6. (*a*) 15 *m* (*b*) 200 *ergs* (*c*) **1200 J.**

□ □

22

Magnetism

1. The diagram shows a bar magnet.



On the diagram :

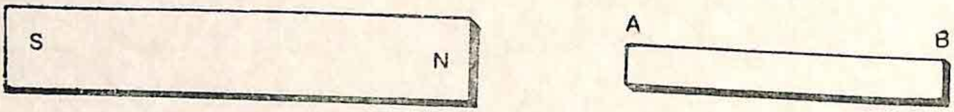
(*a*) (*i*) Mark north pole, south pole.

(*ii*) Draw magnetic axis.

(*iii*) Draw magnetic equator.

(*iv*) Draw effective length between the poles.

(*b*)



When a soft iron bar AB is brought near the magnet it gets magnetised.

(*i*) What polarities are at end:

A. ....

B. ....

(*ii*) Draw the modified lines of force.

(*iii*) What happens to AB when the magnet is removed ?

....

....

....

(*c*) You are given a piece of thread and a soft iron bar. How are you going to know whether the piece of iron is magnetised or unmagnetised ?

....

....

2. Draw diagrams to show that an iron piece is magnetised by—

(*a*) Single-touch method.

(*b*) Double-touch method.

(*c*) Electrical method.

(*d*) Induction method.

3. (*a*) State three ways of demagnetising a bar magnet.

....

....

....

(*b*) What are

(*i*) Permanent magnets : ....

....

Example : ....

....

(*ii*) Temporary magnets : ....

....

Example : ....

....

(*iii*) Electromagnets : ....

....

Example : ....

....

(*c*) Give one use of

(*i*) Temporary magnet :

....

....

(*ii*) Permanent magnet :

....

....

(*iii*) Electromagnet :

....

....

(*d*) Name the substances used for

(*i*) The core of moving coil galvanometer :

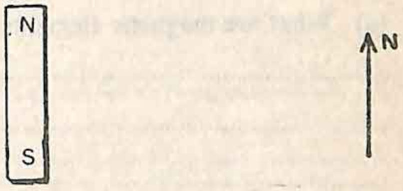
....

(*ii*) Magnetic keepers :

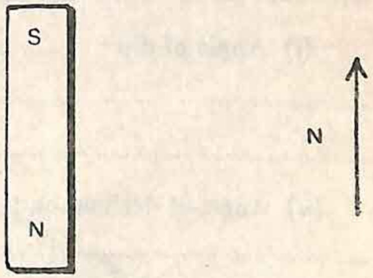
....

4. Draw the lines of force and mark the neutral point when

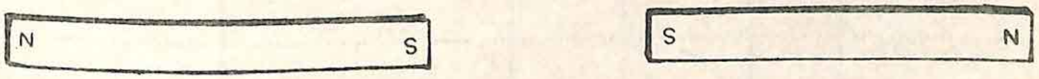
(*a*) North pole points towards North



(*b*) South pole points towards North.



(*c*) Like poles of two magnets of equal strength face each other.



(*d*) Unlike poles of two magnets of equal strength face each other.

(*e*) What happens to a magnet when it is cut into four equal parts ?

....

....

5. **On the basis of atomic theory of magnetism, explain the following :**

(*i*) **Magnetisation of iron :** ....

....

(*ii*) **Demagnetisation of a magnetic material :** ....

....

....

(*iii*) **Steel is used for making a permanent magnet :** ....

....

....

....

6. (*a*) **What are magnetic elements at a place ?**

....

....

....

(*b*) **What do the following terms mean ?**

(*i*) **Angle of dip :** ....

....

....

(*ii*) **Angle of declination :** ....

....

....

(*iii*) **Magnetic meridian :** ....

....

....

(*iv*) **Magnetic equator :** ....

....

(*c*) The three magnetic elements at Dehradun are

(*i*) Angle of declination 0°50′E

(*ii*) Angle of Dip 45°50′

(*iii*) Horizontal component of earth's magnetic field 0·332 oersted.

What information do you get from the above values regarding earth's magnetic field ?

....

....

....

....

7. Magnetic elements of earth's field can be represented by the diagram given below :
Mark on the diagram—

(*i*) Angle of declination.

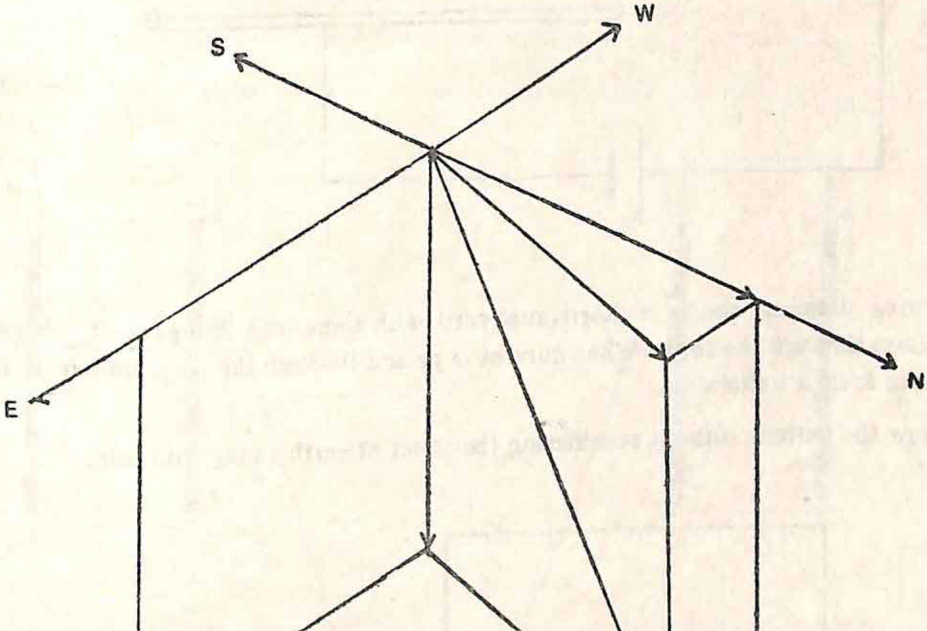
(*ii*) Angle of dip.

(*iii*) Horizontal and vertical component of earth's field.

(*iv*) In which direction are :

Zenith points..

Nadir points..



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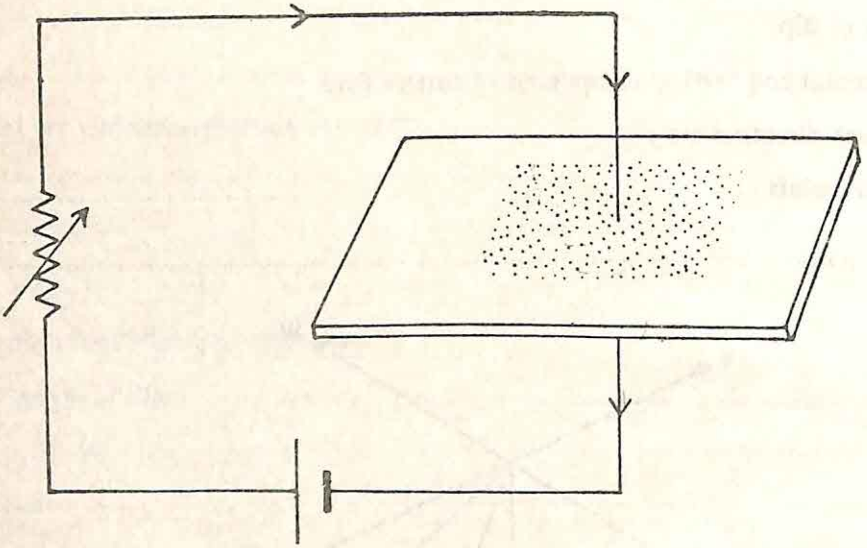
23

Electromagnetic Effect

1.

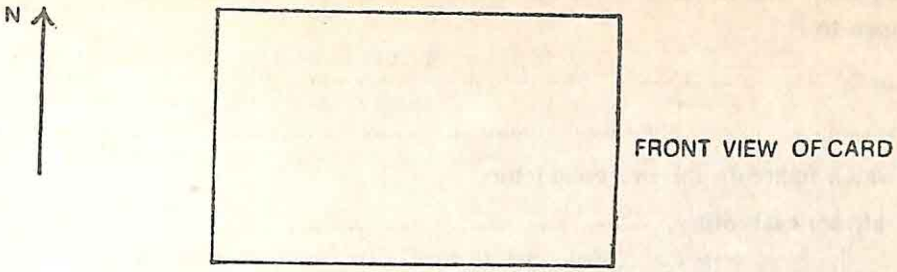


The above diagram shows a horizontal card with some iron fillings on it. A vertical wire passes through the card. When current is passed through the wire, then iron filings arrange to form a pattern.

(*a*) Draw the pattern without considering the effect of earth's magnetic field.

FRONT VIEW OF CARD

(*b*) Draw the pattern when we take in account the effect of earth's magnetic field.



(*c*) Give reason for your observation in (*a*) and (*b*).

……………………………………………………………………………………………

……………………………………………………………………………………………

(*d*) In which direction of the conductor is the magnetic field,

(*i*) Zero : ……………………………………………………………………………

(*ii*) Strongest : ………………………………………………………………………

(*e*) State a rule which helps us to know the direction of the magnetic field due to a straight current carrying conductor :

……………………………………………………………………………………………

……………………………………………………………………………………………

2.

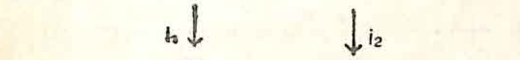


Fig 1

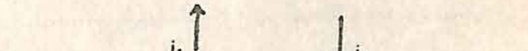


Fig 2

(*a*) Neglecting the effect of the earth's magnetic field, draw the lines of force in the horizontal plane due to two conductors in which current flows as shown above.

(b) A magnetic needle is kept in the middle of the two conductors in Fig. 1. What will happen to it ?

....

....

(c) In which figure do the two conductors

(i) attract each other. ....

....

Give reason. ....

....

....

(ii) repel each other. ....

....

Give reason. ....

....

....

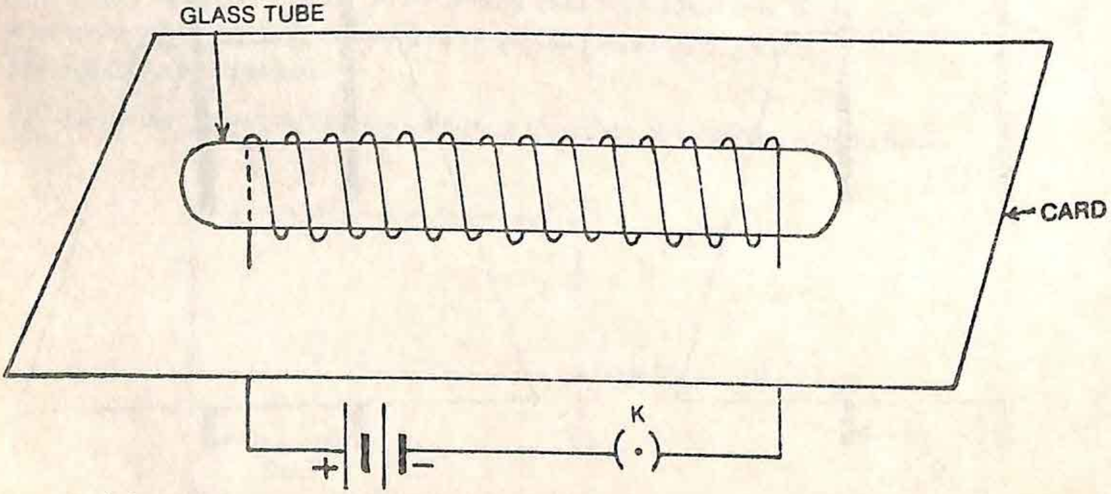
(d) What is your observation if one current is switched off ?

....

....

....

3.



A long wire is wound round a glass tube and it is kept on a card. Some iron fillings are sprinkled on the card.

(*a*) Draw the pattern lines of force which are taken by the iron filings when key K is closed.

(*b*) Draw the direction of flow of current in the coil.

(*c*) Which end of the tube behaves like

(*i*) North pole : ....

(*ii*) South pole : ....

(*d*) When the current is reversed will there by any change in the—

(*i*) Pattern formed.

....

(*ii*) Polarities acquired at the ends of the coil.

....

(*e*) Suggest two ways to increase magnetic flux around the coil.

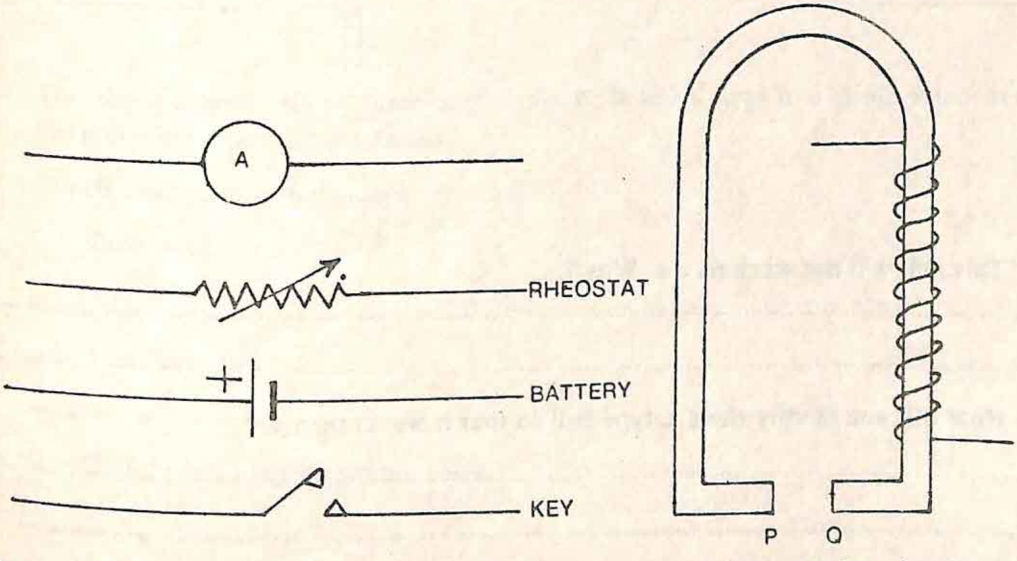
(*i*) ....

....

(*ii*) ....

....

4.



In the diagram above a U-shaped iron piece is wound with incomplete insulated wire. Complete the winding so as to make this an electromagnet. On the side some parts are given. Connect these parts to make the electromagnet.

(*a*) Indicate the current direction in the coil.

(*b*) Name the polarities at P and Q.

P : .... Q : ....

(*c*) How can you increase the strength of the electromagnet ?

....

....

(*d*) What are the differences between an electromagnet and a permanent magnet ?

....

....

(*e*) Give one application of an electromagnet.

....

....

....

....

5. (*a*) Give a labelled diagram of an electric bell (d.c. type).

(*b*) This bell will not work on a.c. Why ?

....

....

(*c*) How will you modity the d.c. type bell so that it works on a.c. ?

....

....

....

(*d*) What material is used for the core of an electric bell. Why ?

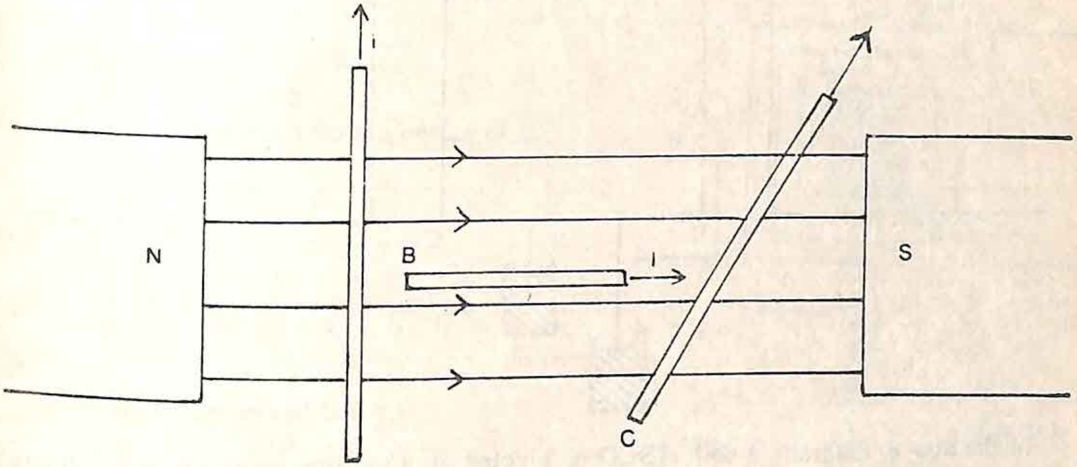
....

□ □

24

Galvanometer, Ammeter and Voltmeter

1.



The above diagram shows three conductors A, B and C kept in a uniform magnetic field. Current I flows in each conductor.

Which conductor experiences :

(*a*) Zero force ?

....

(*b*) Maximum force ?

....

(*c*) Slightly less than maximum force ?

....

(*d*) Name the rule which helps in giving the direction of mechanical force.

....

(*e*) State the rule mentioned in (*d*).

....

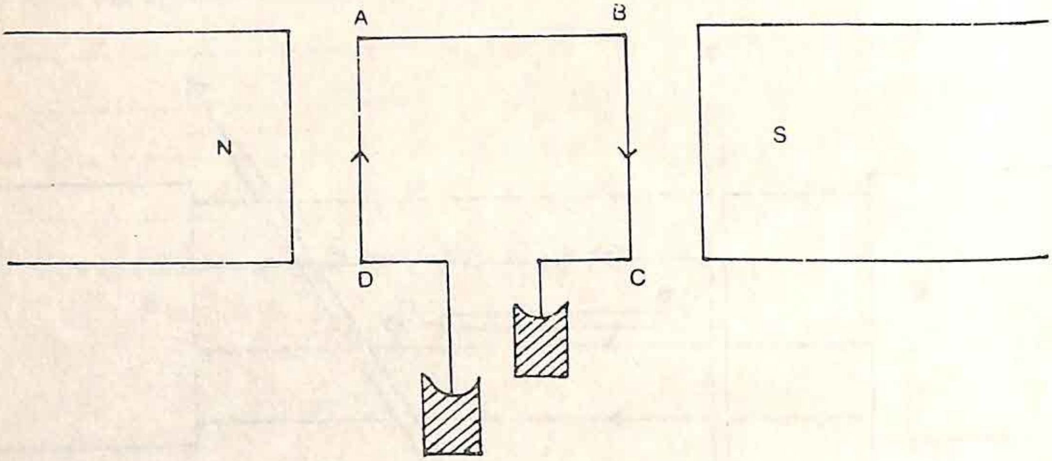
(*f*) Choose the correct one.

Fleming's left hand rule adopts :

(*i*) Electronic current direction/conventional current direction.

(*ii*) Field direction is from South pole to North pole/North pole to South pole.

2.



In the above diagram, a coil ABCD is pivoted in a uniform magnetic field. A current flows through the coil.

(*a*) Name the two sides which experience the force.

(*b*) What is the direction of force on side :

AB :

BC :

(*c*) What is the effect of this force ?

(*d*) In which position does the coil come to rest ?

(*e*) What happens if the direction of the current is reversed ?

....

3. The adjoining diagram shows a suspended type moving coil galvanometer.

(*a*) Name the parts

A. ....

B. ....

C. ....

D. ....

E. ....

F. ....

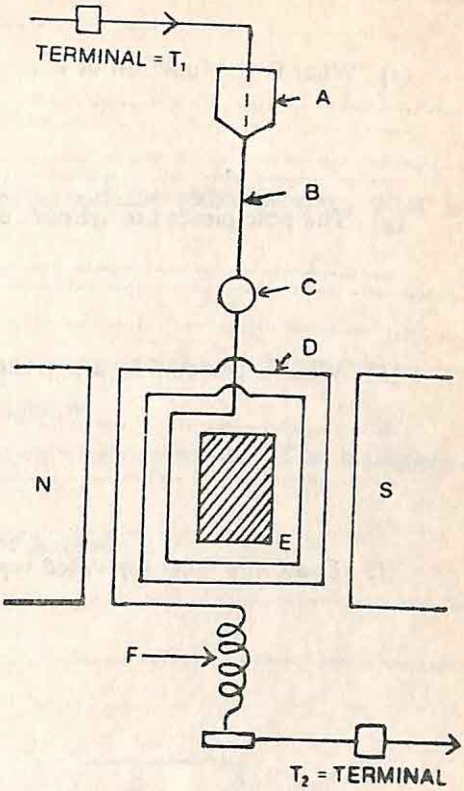
(*b*) Give two reasons for the choice of B.

(*i*) ....

....

(*ii*) ....

....



(*c*) What is the role of C ?

....

....

(*d*) What happens to the deflection of the coil by increasing :

(*i*) Number of turns of D.

....

....

(*ii*) The area of the coil.

....

....

....

(*iii*) Current in the coil.

....

....

(*iv*) Strength of the magnetic field.

....

....

(*e*) What is the function of E ?

....

....

(*g*) The pole pieces are cylindrical in shape. Why ?

....

....

(*h*) What is detected by a galvanometer ?

....

....

....

(*i*) Draw and label a pivoted type galvanometer.

4.

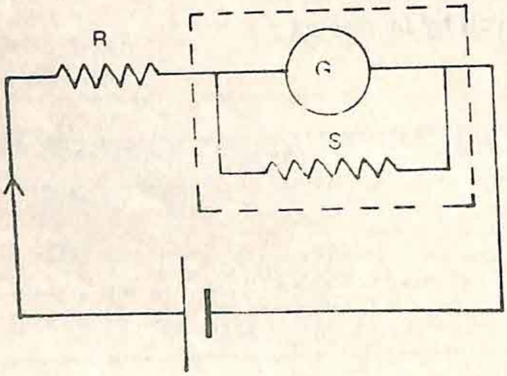


Fig 1

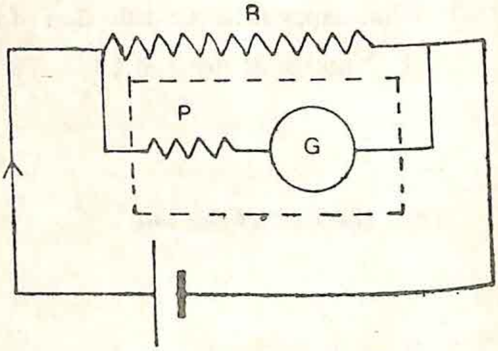


Fig 2

A galvanometer is brought in two different uses as shown in the above figures :

(*a*) In Fig. 1 the galvanometer is capable of measuring—

....

....

(*b*) In Fig. 2 the galvanometer is capable of measuring—

....

....

(*c*) A galvanometer is converted to

(*i*) In Fig. 1 : ....

(*ii*) In Fig. 2 : ....

(*d*) In Fig. 1 'S' resistance is connected in parallel with the galvanometer ; what is 'S called ?

....

....

(*e*) The resistance of S is .... (high/low)

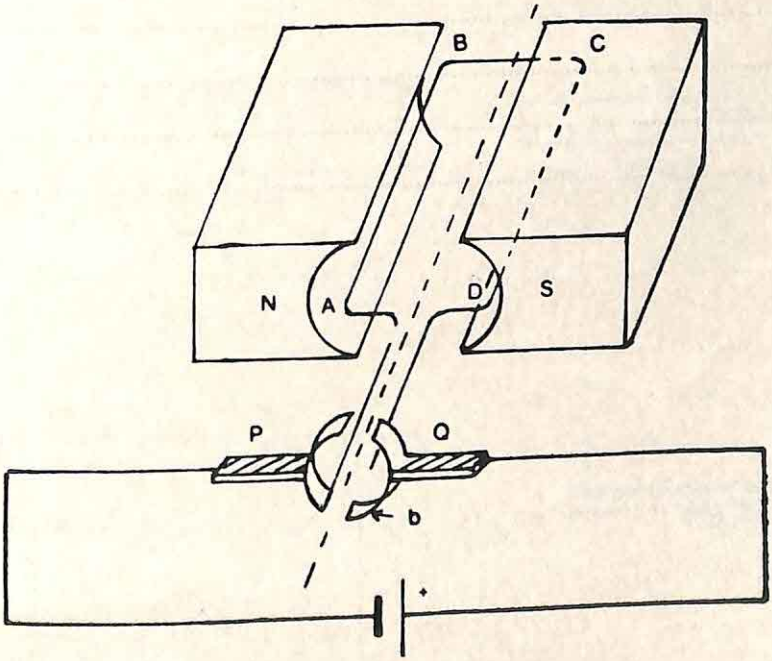
(*f*) In Fig. 2 'P' resistance is connected in series with galvanometer. The resistance of P is ....(high/low)

(*g*) Give reason for the choice of resistance value in part :

(*i*) ....

(*ii*) ....

5.



The diagram above shows a simple D.C. motor. Name the parts.

(*a*) (*i*) ....

(*ii*) 'P' and 'Q' : ....

(*iii*) ABCD : ....

(*b*) Discuss the function of P and Q.

....

(*c*) Mark the current direction in the coil.

(*d*) Give three factors on which the speed of rotation of a d.c. motor depends.

(*i*) ....

(*ii*) ....

(*iii*) ....

(*e*) What is back e.m.f. in a d.c. motor ?

....

....

(*f*) What energy changes can occur in a motor ?

....

....

(*g*) Basically what is the difference between a d.c. motor and a d.c. generator ?

....

....

....

....

☐ ☐

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Electro-Magnetic Induction

1. In the figures below the bar magnet is shown in different positions. Clearly indicate the current direction in the coil and draw the pointer position of the galvanometer in each case.

Fig 1

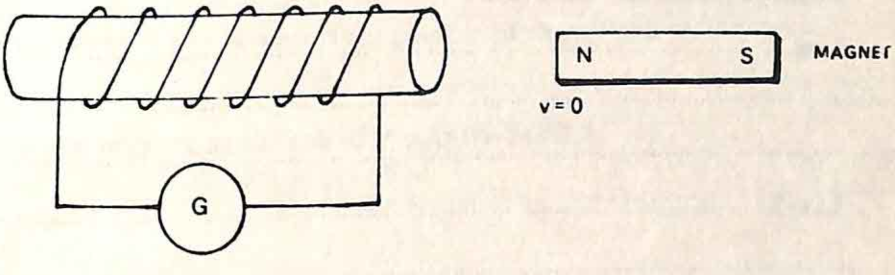


Fig 2

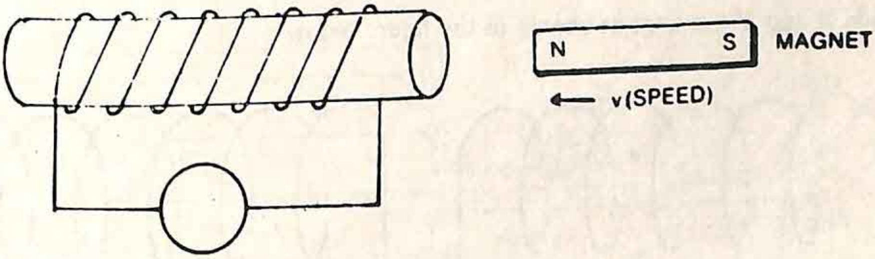
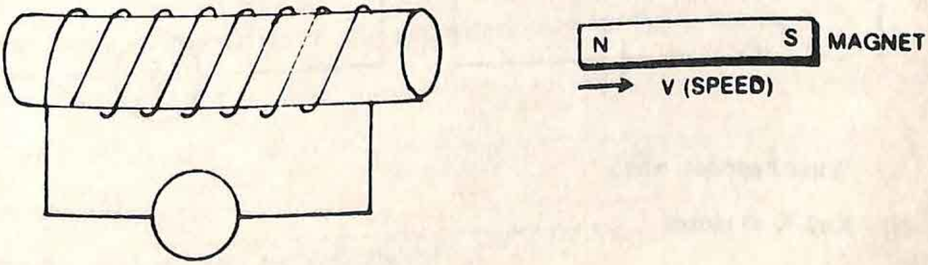


Fig 3



(a) Mark the polarity on the coil in each case.

(*b*) In which of the three pieces will there no current and why ?

....

....

....

(*c*) How will your observation change if a powerful magnet is used ?

....

....

(*d*) What happens to the current when magnet speed is doubled ?

....

....

(*e*) On the basis of the above observations Faraday announced two laws of electromagnetic induction. State them.

Law 1. ....

....

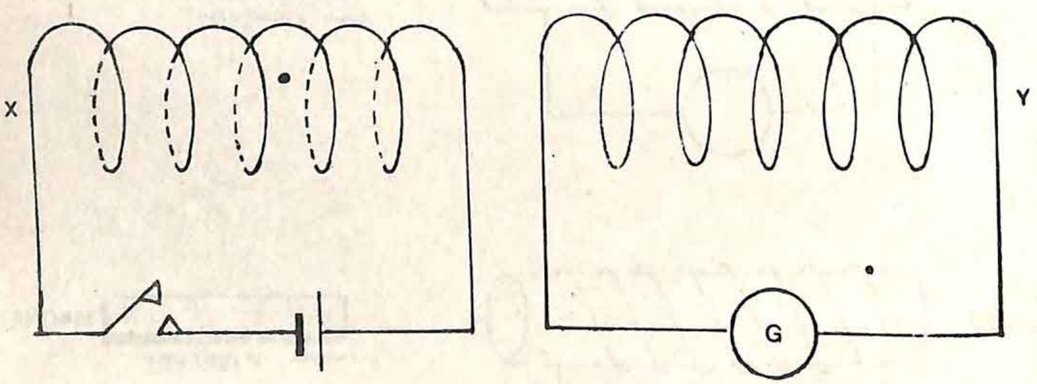
....

Law 2. ....

....

....

2. Coils X and Y are kept as shown in the figure below :



What happens when

(*i*) Key K is closed : ....

....

(*ii*) With key closed coil X is moved rapidly towards Y.

....

....

(*iii*) With key closed the coil Y is moved rapidly towards X.

....

....

(*iv*) With key closed, coils X and Y are moved away from each other.

....

....

(*v*) Key K is open. ....

....

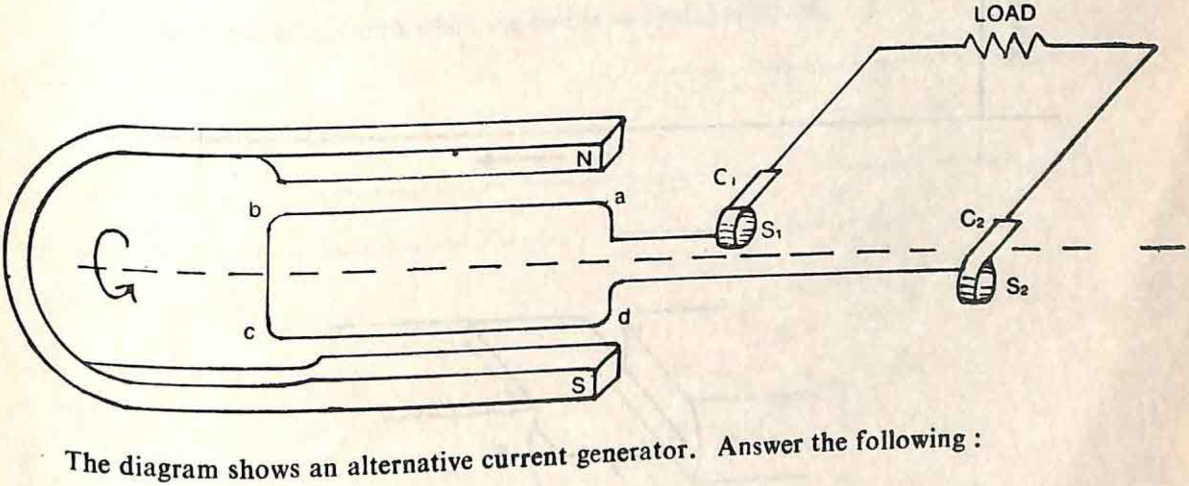
(*vi*) Due to current in coil X what is the polarity of its end near to the coil Y ?

....

(*vii*) What is the polarity of the end of Y near the coil X ?

....

3.



The diagram shows an alternative current generator. Answer the following :

(*a*) What are C_1 C_2 called ? ....

(*b*) What are S_1 S_2 called ? ....

(*c*) Choose the correct one—

(*i*) Magnet used is temporary/permanent :

....

(*ii*) **Magnetic field is radial/horizontal.**

....

....

(*iii*) **For a complete rotation of the coil *abcd* the brush C_2 is, always positive/always negative/alternates its polarity.**

....

....

(*d*) **State the rule to know the direction of current generated.**

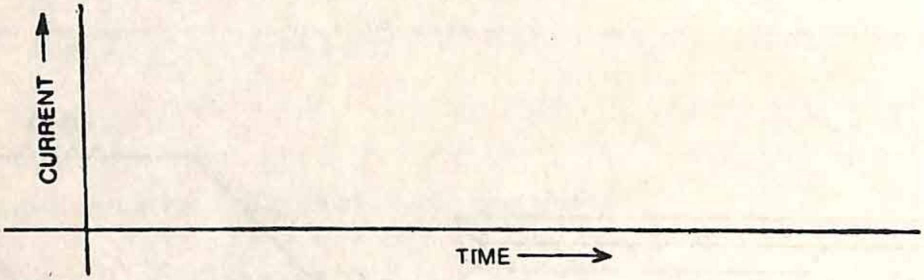
....

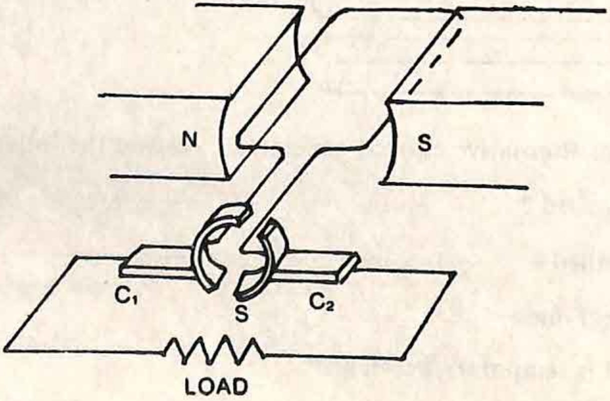
....

....

....

(*e*) **Draw the graph of the output current with respect to the time for a complete rotation treating coil to be initially horizontal.**





The above diagram shows a d.c. generator.

(*a*) Name the parts :

C_1 : ………………………………………… C_2 : …………………………………………

S : …………………………………………

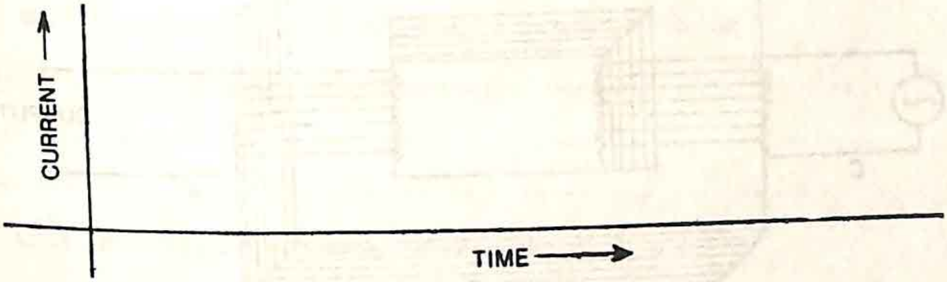
(*b*) What is the difference in the construction of a.c. and d.c. generators ?

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

(*c*) Draw the output current with respect to the time.



(*d*) Choose the correct one :

Current in the coil is zero when the coil is vertical/horizontal.

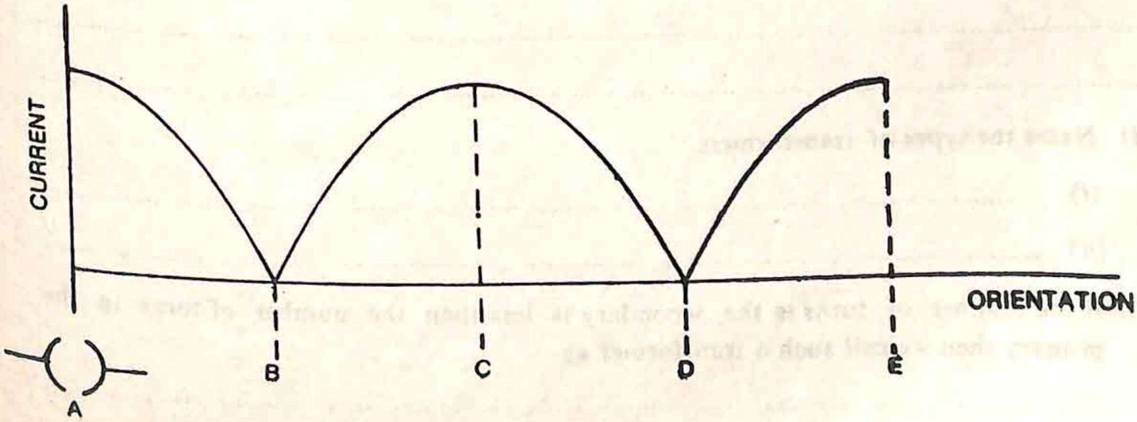
……………………………………………………………………………………

Give reason for above.

……………………………………………………………………………………

……………………………………………………………………………………

(e)



One position of commutator is shown.

Draw the commutator position on the diagram for position B, C, D, E.

(*f*) What is self-induction ?

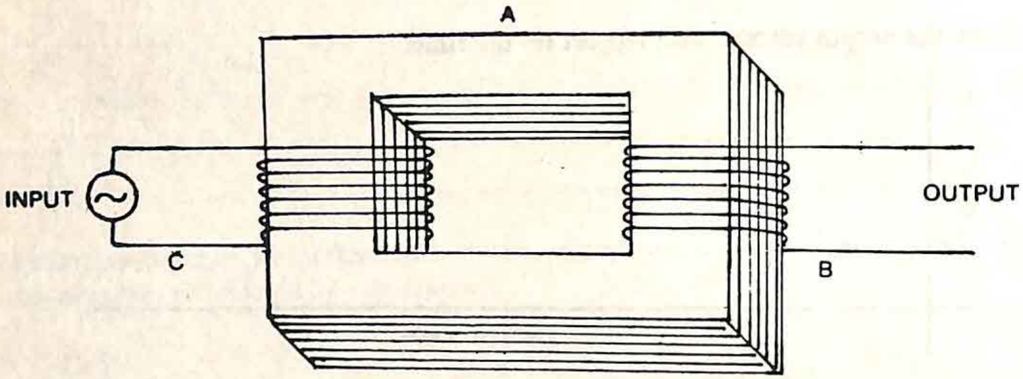
....

....

(*g*) Is the D.C. obtained constant or varying ?

....

5.



The diagram above represents a transformer.

(*a*) Lable A— .... B : .... C : ....

(*b*) The transformer is only used with alternating current/direct current. Choose the correct one.

....

(*c*) Why is it necessary to coil the primary and secondary wire on laminated sheets ?

....

....

....

(*d*) Name the types of transformers :

(*i*) ....

(*ii*) ....

(*e*) If the number of turns in the secondary is less than the number of turns in the primary then we call such a transformer as

....

(*f*) Give an expression for

(*i*) Input power : ....

(*ii*) Output power : ....

(*g*) What is transformer constant ?

....

....

(*h*) Sometimes a transformer makes noise. Why ?

....

....

(*i*) Why do we use step-up transformer for long transmission ?

....

....

....

(*j*) Give one advantage of generating A.C. over D.C.

....

(*k*) State two uses of a transformer.

....

....

□ □

26

Electronics : Atomic Structure

1. (*a*) An atom is composed of ……………………………………………………

(*b*) The nucleus of an atom contains ……………………………………………………

……………………………………………………………………………………

(*c*) The term nucleon means ……………………………………………………

(*d*) The total number of nucleons is called as ……………………………………………………

(*e*) Some X charges revolve around nucleus in well-defined orbits.

(*i*) What are 'X' called ? ……………………………………………………

(*ii*) How many charges are in the first shell ? ……………………………………………………

(*iii*) What is the criteria to know the number of 'X' charges in the second shell ?

……………………………………………………………………………………

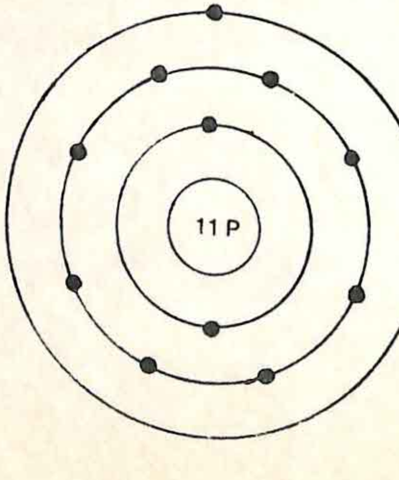
(*f*) What is the order of size of nucleus ? ……………………………………………………

……………………………………………………………………………………

(*g*) What is the order of size of an atom ? ……………………………………………………

……………………………………………………………………………………

(*h*) Practically the entire mass of an atom is concentrated in ……………………………………



2. Sodium atom has given atomic structure.

(*a*) How many electrons are revolving ?

……………………………………………………

(*b*) Looking at the structure, what is its valency ?

……………………………………………………

(*c*) How many protons are there ? ....

....

(*d*) If mass number of Na is 23 then what is nucleon number ? ....

....

(*e*) Work out the number of neutrons. ....

(*f*) According to which theory is the given atomic model. ....

....

(*g*) Choose the correct one :

The above-mentioned theory suggest :

(*i*) Orbit of electrons are circular/elliptical.

(*ii*) The orbits are radiating/non-radiating.

(*iii*) Electrons can go to the higher orbit after absorbing a fix quantum of energy. It stays there for ever/it jumps to lower orbit/it jumps to lower orbit by radiating energy.

....

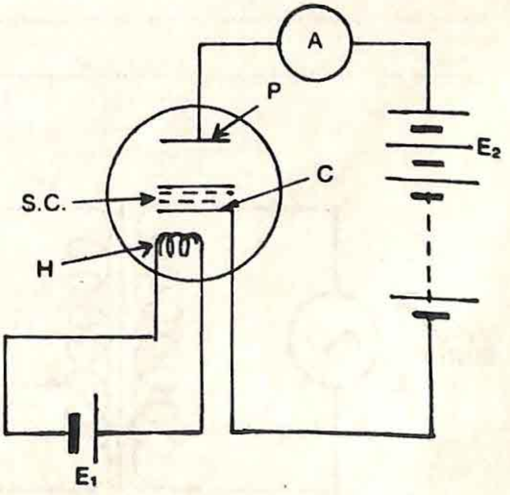
3. (*i*) What are isotopes of an element ? ....

....

(*ii*) Give two examples of isotopes. ....

....

4. Diagram shows a diode in its principal mode of operation.



(*a*) Name the parts

P : ....

C : ....

H : ....

(*b*) What is the region 'S.C.' called ?

....

(*c*) State the role served by

E$_1$: ....

....

E$_2$: ....

....

(*d*) **What is 'A' called and what is measured by A ?**

....

....

(*e*) **What is thermionic emission ?**

....

....

(*f*) **State what happens when value of**

E$_2$ is increased : ....

....

E$_1$ is increased : ....

....

(*g*) **Why is diode called valve ?**

....

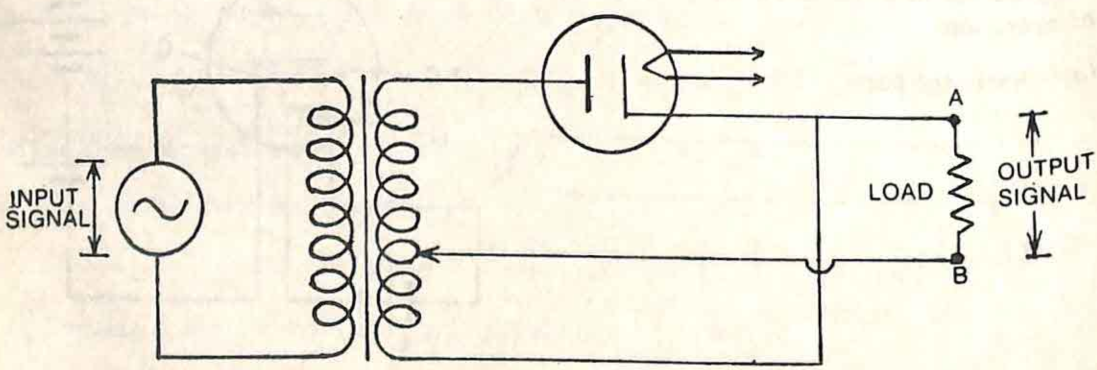
....

(*h*) **What purpose is served by this device ?**

....

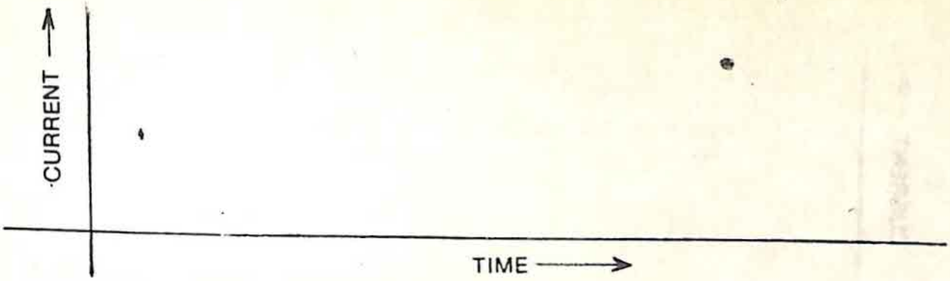
....

5.



The given circuit shows a diode as a half wave rectifier. If the input in the above diagram is alternating current then :

(*a*) L Current-Time graph for output.



(*b*) Why is the valve dead for sometime ?

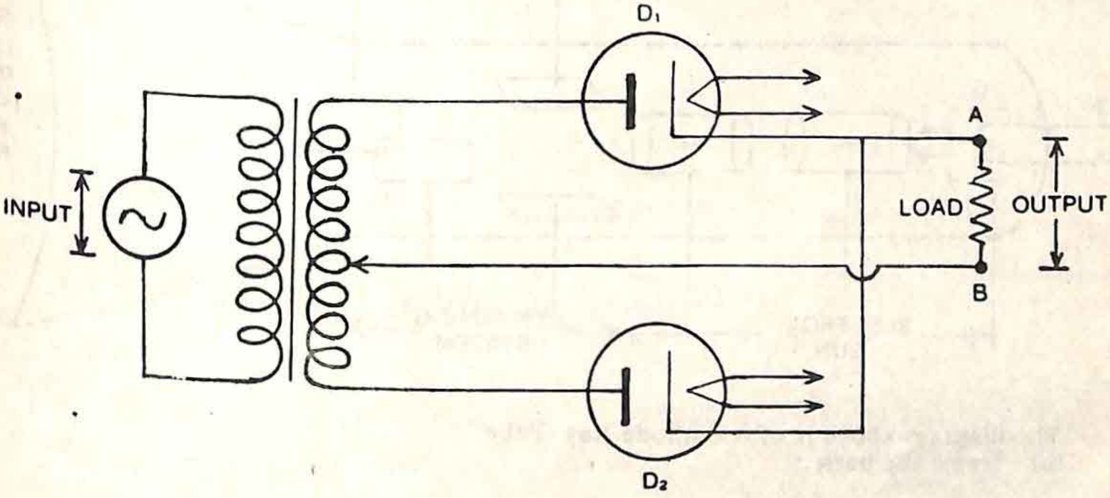
....

....

(*c*) Which of the terminals A and B is positive ?

....

(*d*) On the circuit show electronic current direction.



In the given circuit the diode acts as full wave rectifier.

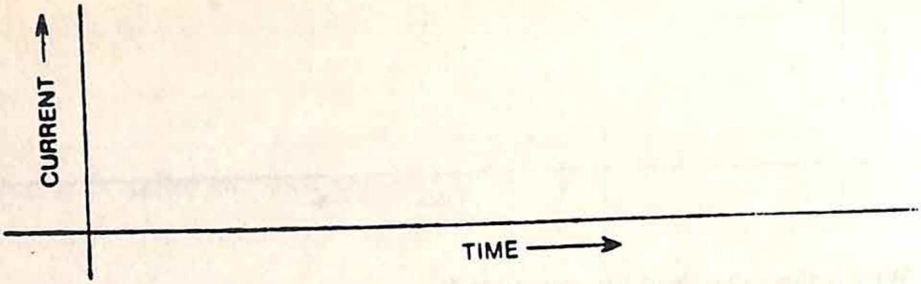
(*a*) What do you mean by rectification ?

....

....

....

(*b*) Draw the output form of Current Vs Time obtained at A and B.

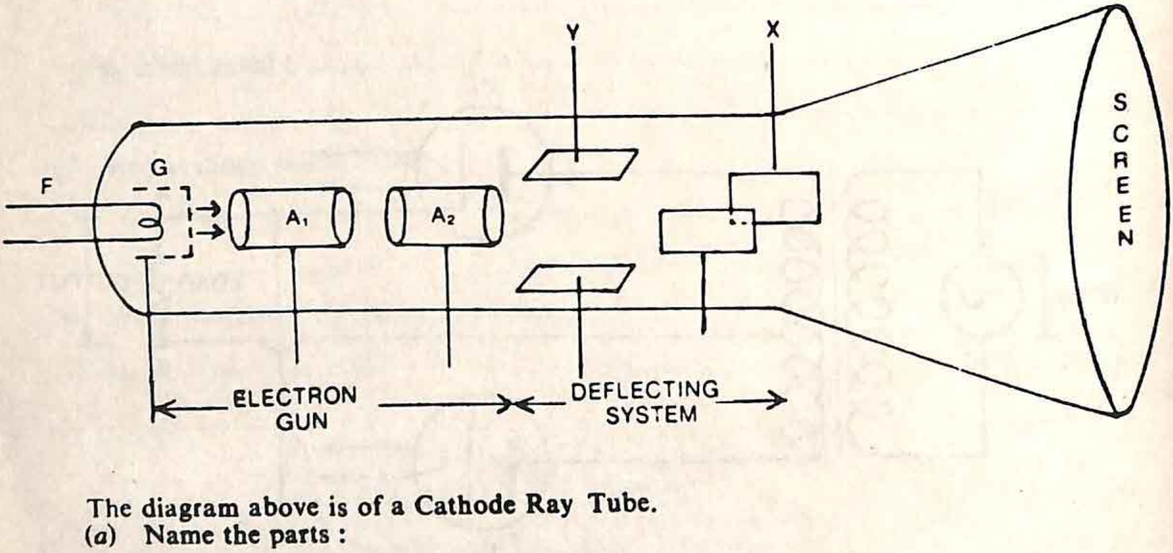


(*c*) On the circuit show electronic current path.

(*d*) What additional component is added in order to obtain pure D.C. ?

....

7.



The diagram above is of a Cathode Ray Tube.

(*a*) Name the parts :

F : ....

G : ....

A_1 : ....

A_2 : ....

X : ....

Y : ....

What is the approximate pressure inside the tube ?

....

....

(*c*) Name one material of which the screen can be made.

....

(*d*) State the function of :

Electron Gun : ....

....

Deflecting plates : ....

....

....

(*e*) If the deflecting system is not working then where on screen does the beam of electrons strike.

(*f*) What happens to the beam of electron if

X-plate works : ....

....

Y-plate works : ....

....

(*g*) Give the phenomena which occur on the screen.

....

(*h*) State one application of a Cathode Ray Tube.

....

....

....

8. (*a*) What is a photo-electric effect ?

....

....

....

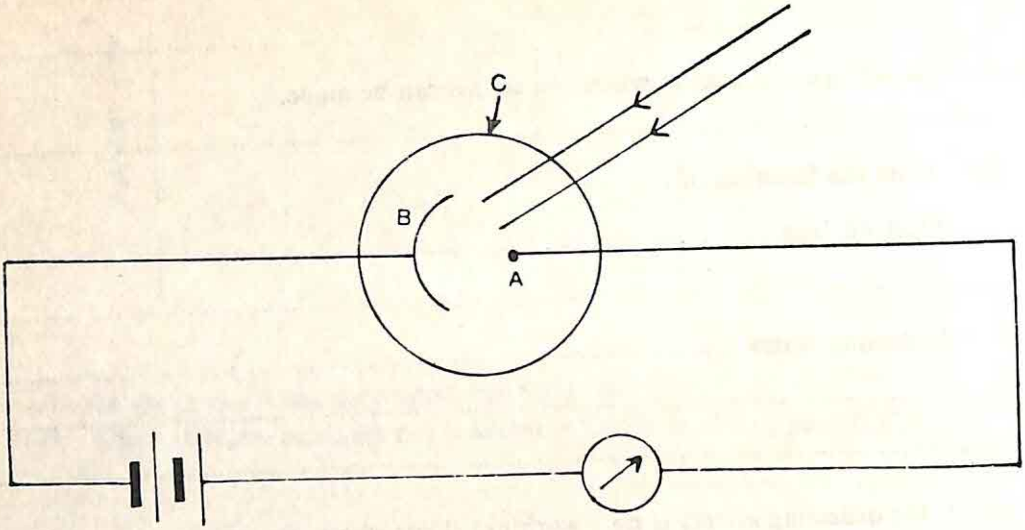
(*b*) Name three materials which can make photo-surfaces.

....

....

....

(*c*)



In the circuit above, a photo cell is connected with a battery and an ammeter.

(*i*) Name the parts :

A : ....

B : ....

C : ....

(*ii*) Define :

Threshold frequency :

....

....

Work function of the surface :

....

....

(*d*) Which light red or blue will increase

(*i*) Kinetic energy of the photo-electrons.

....

(*ii*) Ammeter reading.

....

(*iii*) What happens to the ammeter reading if the intensity of light is doubled.

....

……………………………………………………………………………………

9. (*a*) Give three applications of photo-electric effect.

1. ……………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

2. ……………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

3. ……………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

(*b*) **What is the energy change in :**

(*i*) **Thermionic emission.**

……………………………………………………………………………………

(*ii*) **Emission of photo-electrons.**

……………………………………………………………………………………

10. (*a*) **What do you mean by :**

(*i*) **Broadcasting.**

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

(*ii*) **Point to point communication.**

……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

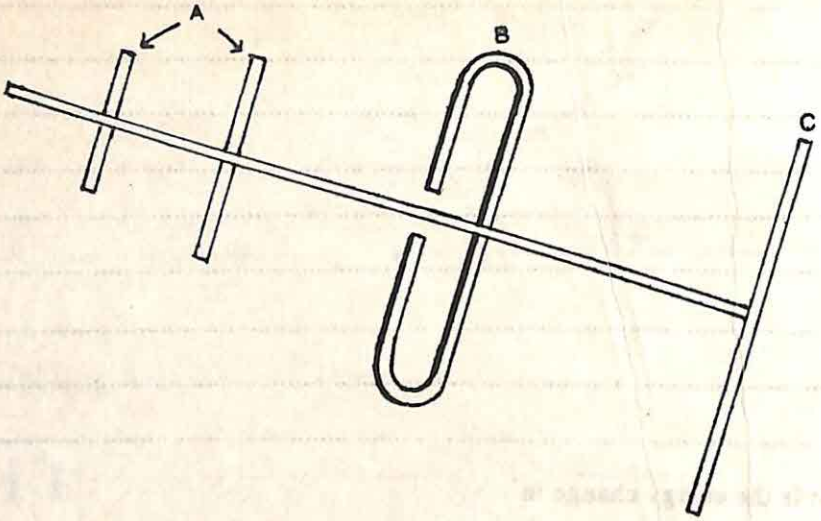
(*b*) **What do the following abbreviations stand for ?**

AM : ……………………………………………………………………

FM : ……………………………………………………………………

VHF : ……………………………………………………………………

UHF : ……………………………………………………………………



A television antenna has directed rods, reflector rod and antenna loop. Match these with A, B and C on the above figure.

A : ....

B : ....

C : ....

(*d*) Sometimes on a television screen, a number of images are seen alongwith the main image. What are these images called ?

....

(*e*) Choose the correct one :

On a television screen a following phenomena takes place :

(*i*) Phosphorescence.

(*ii*) Photo-electric effect.

(*iii*) Flourescence.

....

(*f*) Name one material which can give the above-mentioned phenomena.

....

☐ ☐

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X-Rays

1. (*a*) **Why do X-rays not penetrate bones ?**

....

....

....

(*b*) **Give one application of X-rays in the field of :**

(*i*) Medical science : ....

....

....

....

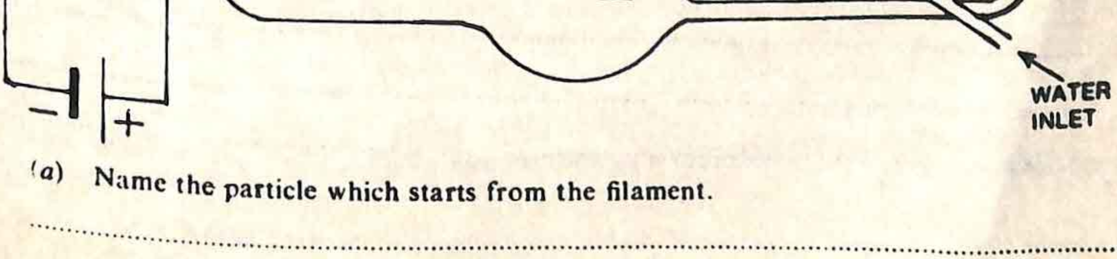
(*ii*) Industrial science : ....

....

....

....

2.



(*a*) **Name the particle which starts from the filament.**

....

(*b*) **What form of energy does this particle possess ?**

....

(*c*) **What happens to the energy of particle after striking the target ?**

....

....

....

(*d*) **Give two reasons for the choice of tungsten target :**

(*i*) ....

....

(*ii*) ....

....

(*e*) **What is given out from the target after absorbing the energy of the striking particle ?**

....

....

....

(*f*) **Give three properties of the radiation given out from the target :**

(*i*) ....

(*ii*) ....

(*iii*) ....

(*g*) **Why is it necessary to cool the target ?**

....

(*h*) **What are soft X-rays ?**

....

....

(*i*) **What are hard X-rays ?**

....

....

....

☐ ☐

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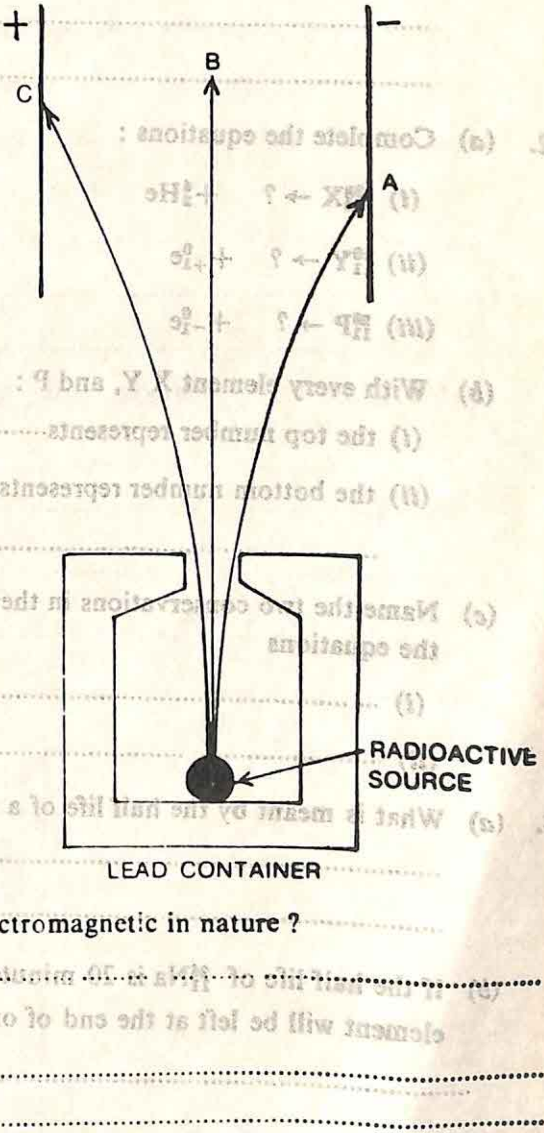
Radioactivity

1. (*a*) The diagram shows deflection of radiations A, B, C from a radioactive source.



(*i*) Name the radiations :

A : ....

B : ....

C : ....

(*ii*) What is the nature of the radiations ?

A : ....

B : ....

C : ....

(*iii*) In comparison to the radiation C, the radiation A is less curved. Does this give any idea of their masses ?

....

....

(*iv*) Of A, B and C, which radiation is electromagnetic in nature ?

....

(*v*) Give two properties of (*iv*) :

1. ....

2. ....

(*b*) What are the changes in the composition of a radioactive nucleus if it **disintegrates** by the emission of

(*i*) an Alpha particle : ....

....

(*ii*) a Beta particle : ....

....

(*c*) A radioactive nucleus A which has mass number 238 and proton number 92 changes to nucleus B whose mass number is 234 and proton number 90. What particle was emitted ?

....

Explain how you arrive at your answer.

....

....

2. (*a*) Complete the equations :

(*i*) $^{238}_{92}X \rightarrow ? \quad + ^{4}_{2}He$

(*ii*) $^{30}_{11}Y \rightarrow ? \quad + ^{0}_{+1}e$

(*iii*) $^{23}_{11}P \rightarrow ? \quad + ^{0}_{-1}e$

(*b*) With every element X Y, and P :

(*i*) the top number represents..

(*ii*) the bottom number represents..

....

(*c*) Name the two conservations in the above equations which are necessary to balance the equations

(*i*) ....

(*ii*) ....

3. (*a*) What is meant by the half life of a radioactive element ?

....

....

(*b*) If the half life of $^{24}_{11}Na$ is 20 minutes, how much of the original mass 80 g of the element will be left at the end of one hour ?

....

....

....

4. (*a*) State one

(*i*) Medical use of radio activity.

....

....

....

....

....

(*ii*) Industrial use of radio-activity.

....

....

....

(*iii*) Scientific use of radio activity.

....

....

....

(*b*) What are the safety precautions to be observed when experimenting with a radio-active substance ?

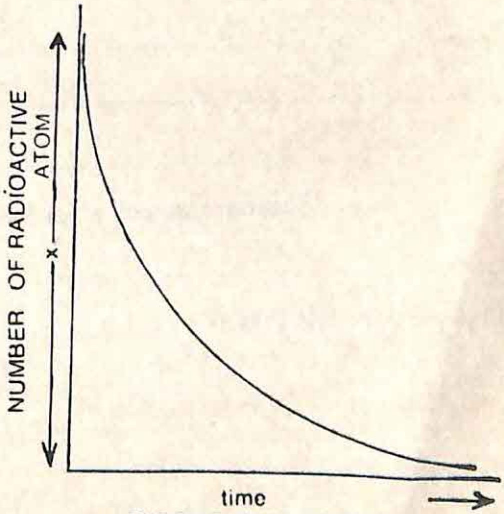
....

....

....

....

5. The figure shows decay curve of a radio active element. Answer the following questions in terms of **X** :



EXPONENTIAL CURVE

(*a*) **What is the original number of active atoms ?**

....

(*b*) **Label first half life and note its corresponding active atoms.**

....

(*c*) **Label second and third half life and note their corresponding active atoms.**

For second half life : ....

For third half life : ....

(*d*) **What is the ratio of active atoms of second and third half life ?**

....

....

....

ANSWERS

3. (*b*) 10 g.

☐ ☐

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Nuclear Physics

1. (*i*) **What is nuclear fission and nuclear fusion ?**

Fission :

....

....

Fusion :

....

....

(*ii*) **Name the particle which is bombarded to bring about the fission process.**

....

(*iii*) **What is the source of nuclear energy in fission process ?**

....

2. (*a*) **One atomic mass unit = 1·6604 × kg.**

(*b*) **Four hydrogen atoms each of mass 1·00813 a.m.u. fuse to give a helium nucleus of mass 4·00386 a.m.u. Compute the amount of energy released.**

....

....

....

....

3. (*a*) **What is the order of temperature required for a fusion process ?**

....

(*b*) **In a reactor 1 kg of uranium produces..............................times more energy than 1 kg of coal,** (*c*) What do you mean by binding energy ?

....

....

(*d*) What is a mass defect ?

....

....

4. (*a*) How many nuclear power stations do we have in our country ?

....

....

....

(*b*) At present Bhabha Atomic Research Centre has installed four research reactors. Name these reactors.

....

....

....

....

ANSWERS

2. (*b*) 26·68 MeV.

□ □

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The Solar System

1. (*a*) What is a galaxy ?

....

....

(*b*) What is a milky way ?

....

....

(*c*) The centre of our galaxy lies in the densest part of milky way in the constellation Cassiopeia/Great Bear/Sagittarius. Choose the correct alternative.

(*d*) About which point do the stars of our galaxy rotate ?

....

....

(*e*) What is the position of the sun in our galaxy ?

....

....

2. (*a*) What are

(*i*) Asteroids :

....

....

(*ii*) Meteors :

....

....

(*iii*) Comets :

....

(*iv*) Where in our solar system do the maximum number of asteroids exist ?

....

....

(*v*) Name the largest asteroid.

....

(*b*) Write the names of different planets of the solar system in

(*i*) descending order of size.

....

....

(*ii*) descending order of distance from the sun.

....

....

3. (*a*) Which planet is

(*i*) Nearest to the earth.

....

(*ii*) Farthest from the sun.

....

(*iii*) Reddish in appearance.

....

(*iv*) Yellowish in colour

....

(*b*) Name the planet which has

(*i*) 10 satellites : ....

(*ii*) 5 satellites : ....

(*iii*) 12 satellites : ....

(*c*) Name two planets with two satellites each ?

....

(*d*) Name a planet whose

(*i*) period of revolution is the same as period of its rotation.

....

(*ii*) period of revolution is 248 years.

………………………………………………………………………………………………

(*iii*) period of rotation is nearly the same as that of the earth.

………………………………………………………………………………………………

4. (*a*) What is the difference between

(*i*) A Star and a Planet ? :

………………………………………………………………………………………………

………………………………………………………………………………………………

(*ii*) A Planet and a Satellite ? :

………………………………………………………………………………………………

………………………………………………………………………………………………

(*b*) Name a planet whose one face always points towards the sun.

………………………………………………………………………………………………

(*c*) Name a satellite whose one face always points towards its own planet.

………………………………………………………………………………………………

(*d*) "Normally life is not possible on any other planet except the earth." **Can you** briefly give reasons for the above-said statement.

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

5. (*a*) What is the source of energy on the Sun ?

………………………………………………………………………………………………

(*b*) Which elements are found in abundance in the sun's atmosphere ?

………………………………………………………………………………………………

(*c*) What is the approximate surface temperature of the Sun ?

………………………………………………………………………………………………

(*d*) What times does a ray of sunlight take to reach the earth ?

………………………………………………………………………………………………

(*e*) What is a light year ? ………………………………………………………………

………………………………………………………………………………………………

(*f*) What are

(*i*) Sun spots : ....

....

(*ii*) Solar flares : ....

....

(*g*) What is the period of rotation of the Sun ?

....

6. (*a*) Name three constellations of the northern sky.

....

....

....

(*b*) Name three constellations of the southern sky.

....

....

....

(*c*) What is a pole star ?

....

(*d*) With the help of constellation the Great Bear, how can you locate the position of the pole star ?

....

....

(*e*) How has pole star been helpful to us ?

....

....

7. What do you mean by

(*i*) Cygnus : ....

....

(*ii*) Ursha minor : ....

....

(*iii*) Orion : ....

....

(iv) Corona Borealis : ....

....

....

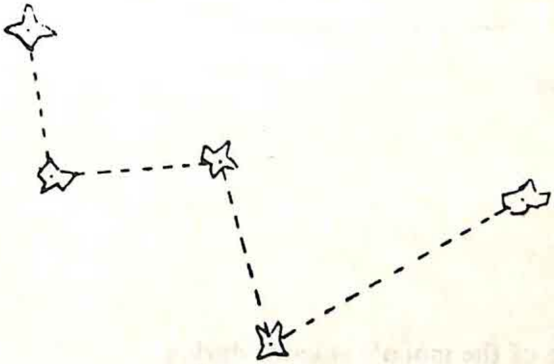
(v) Scorpio : ....

....

....

8 (a) Identify

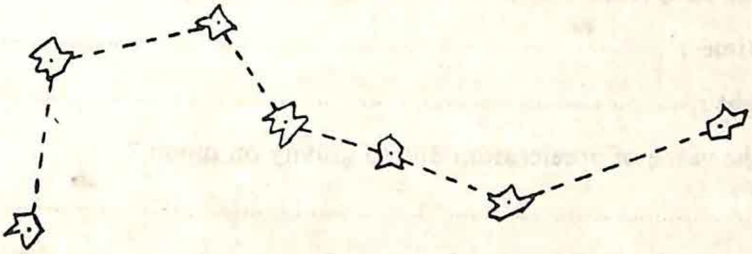
(i)



Constellation

....

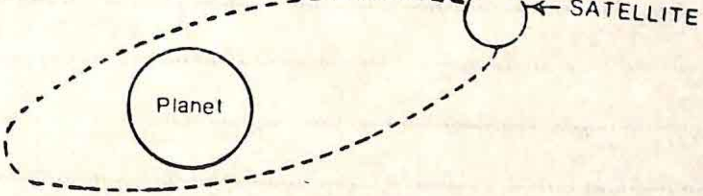
(ii)



Constellation

....

(iii)



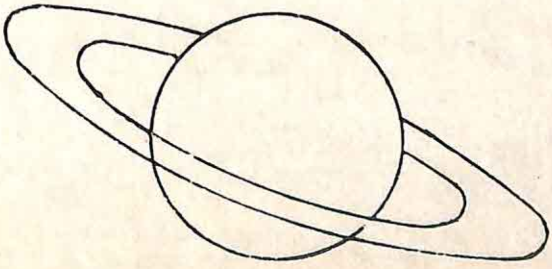
Planet

....

Satellite

....

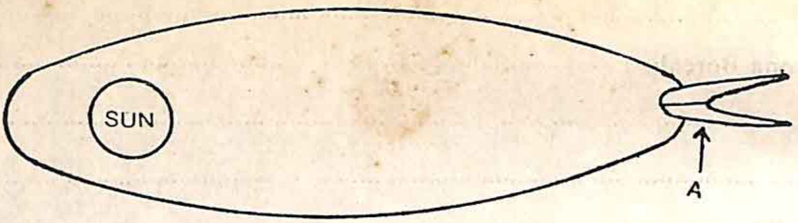
(vi)



Planet

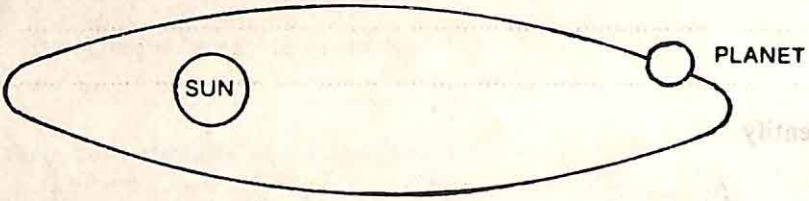
....

(*v*)



A...........

(*b*)



Mark on the figure above

(*i*) Perihelion distance

(*ii*) Apehelion distance

(*iii*) Semi-major axis

(*iv*) Semi-minor axis.

9. (*a*) What is the temperature of the moon'e equator during

(*i*) day time : ....

(*ii*) at night : ....

(*b*) What is the value of acceleration due to gravity on moon ?

....

(*c*) Why is there no atmosphere on the moon ?

....

....

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☐ ☐